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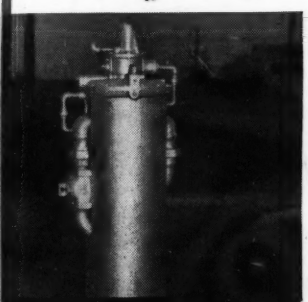

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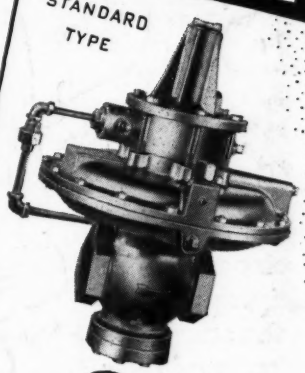

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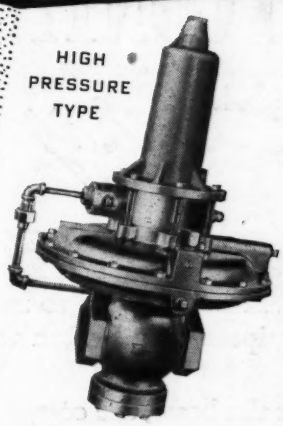

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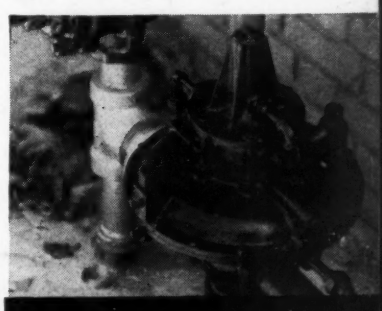

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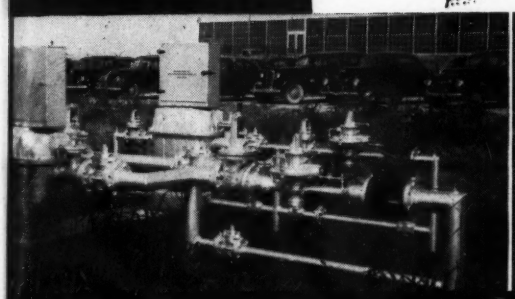

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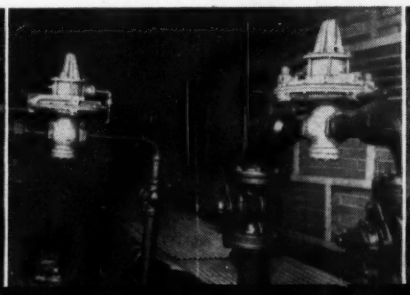

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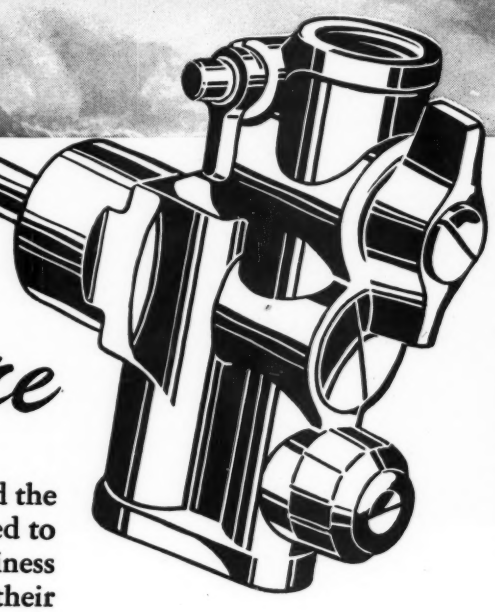

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GAS

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Twentieth Year of Publication

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GUEST EDITORIAL

A GREATER FUTURE

For Industrial and Commercial Gas

By CHARLES G. YOUNG

Manager, Springfield Gas Light Co., Springfield, Mass.
Chairman, Industrial and Commercial Gas Section
American Gas Association, New York, N. Y.

THE significance of the 1944 American Gas Association War Conference on Industrial and Commercial Gas is that it comes at a time when the gas industry's outstanding contribution to war production, and to feeding millions of military people, has about reached its permanently high peak, and plans for the vast reconversion job, and for the competitive post-war period, are in the making.

No one has to be told that there is hardly a factory, mill, or shop on this continent which has not been converted, wholly or partly, from peacetime manufacturing to hard driving, 24-hours-a-day production of the hundreds of thousands of articles used in such tremendous quantities in a war of global proportions; nor does one have to be told of the great installations of gas cooking, baking, water heating and cantonment heating throughout the country that have played such an important part in building up millions of strong and alert bodies for the Army, the Navy and Marine Corps. Also, everyone is familiar with the entirely new scale on which gas has met its duty and it opportunities in cooking good meals around the clock in war production plants. And, finally, it is common knowledge that gas equipment in civilian eating establishments (both large and small) is being greatly overworked.

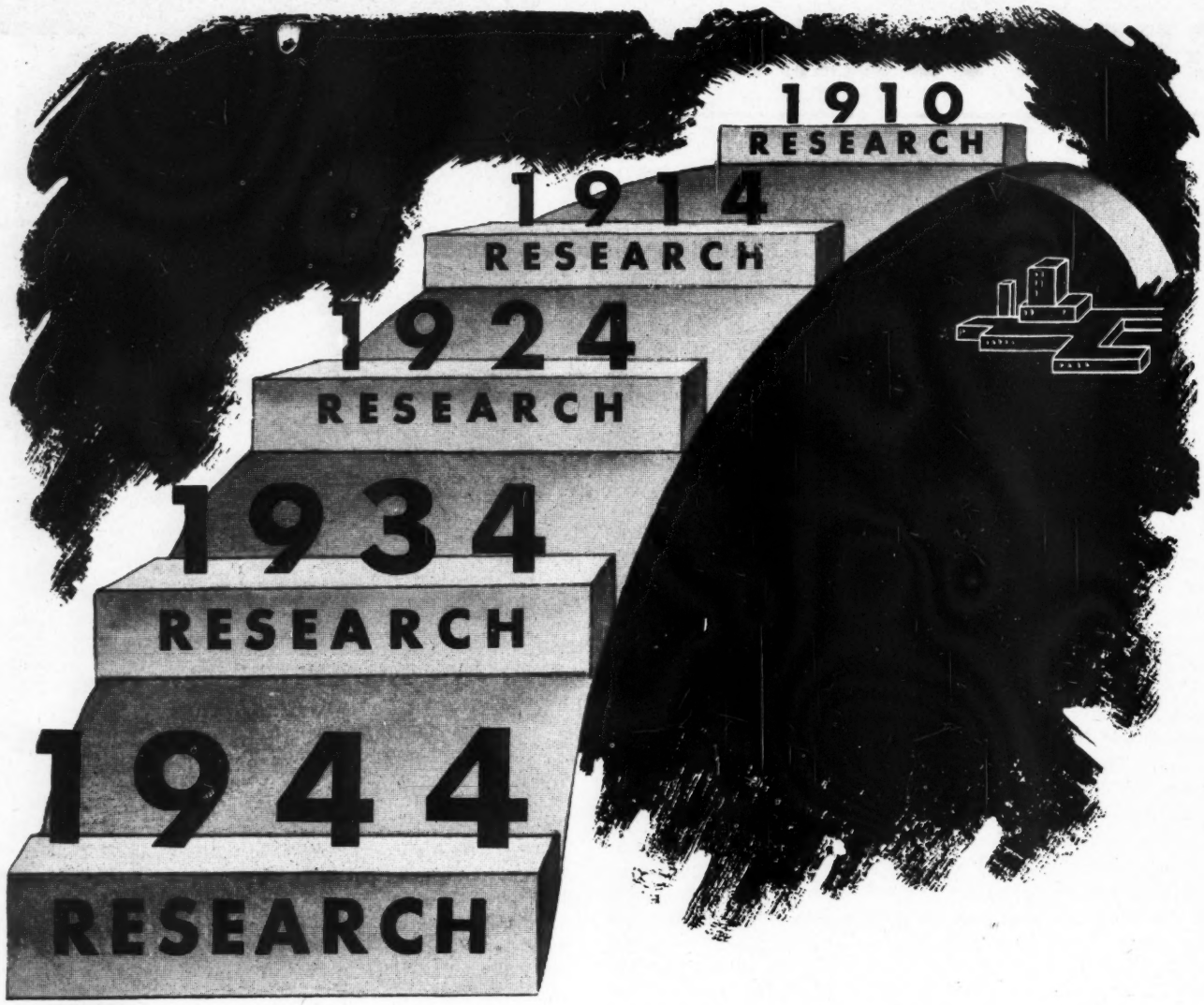
To meet fully the impact of war, and to expand our part in war production and mass feeding, required an all-out effort on the part of industrial and commercial gas that has never been matched before. Millions of dollars of new natural and manufactured gas equipment had to be built and installed in the workshops and in the great kitchens that are part of the war machine. Engineering problems on a scale never before faced had to be solved quickly and in vast number, and they had to be solved right. Old processes had to be improved, and new processes had to be devised and perfected. The specifications for each intricate part of every piece of war supplies are tougher than ever before, and no second can get by when lives depend upon the quality of heating that goes into its manufacture or preparation.

While some additions are still being made, and some cutbacks are being experienced, we have reached the place now where the big job of building a new industrial plant, and converting our old industrial plant, has greatly tapered off, and where that plant is now being pushed to its absolute maximum of daily capacity. Indusutrial gas men (both utility and equipment manufacturers) are regularly endeavoring to keep apparatus working at its full capacity, and will continue to do so until the war is won.

We face the gigantic task of reconverting to peacetime manufacturing the great production plant industrial gas has helped to create. We face the task of completely rebuilding or replacing the numberless food service installations that are giving their life blood to feed a hungry nation that is overtaxing every hotel, restaurant, lunchroom, and industrial cafeteria in the land. We do not know when we will be able to swing into action to accomplish these tasks; but we do know this: in many respects the task will be far greater than was that of building and altering equipment for war production plants, and of equipping Army and Navy bases and war plant cafeterias for cooking food for the fast-growing military personnel and the mass of war workers.

The reasons? First, the necessity for selling industrial and commercial gas and gas equipment on a basis that will make money for the purchasers. Second, competition. These two paramount conditions were not fully present in a war economy that was featured by scarcity of materials and manpower, by government financing of new equipment, and by government purchase of all that those plants can produce. Nor could they be present while patriotism was exerting its strong influence toward cooperation between those who are normally rivals in selling. When those forces are no longer controlling, industrial and commercial gas will suddenly face its great challenge. That challenge can defeat us or it can be turned into a great opportunity.

The 1944 AGA Industrial and Commercial Gas Conference for natural and manufactured gas men, in Rochester, N. Y., March 30 and 31, comes at a time when the vast experiences gained through four years of preparedness and war production are being analyzed and catalogued for future use. But it also comes at a time when that experience must be translated into dynamic tools for action in meeting the engineering problems of reconversion. With sound and advanced engineering, the economic and competitive problems of reconverting and rehabilitating gas installations, from the largest to the smallest, can and will be met with the utmost confidence.



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Thermally Thinking

By ELLIOTT TAYLOR, Washington Editor

Pipe Dreams

WELL, we observe that the lavendar smoke of a new pipe dream is curling around in the solicitous brains of that segment of industry which is out to save American womanhood from a fate worse than death at the kitchen sink. And there is even some indication of an impending battle for the gallant privilege of taking the future load off those slight shoulders that are presently engaged in riveting boiler plate, slopping the shoats, and piloting 10-ton freight trucks over the highways.

This should be good news to the twilight sleep girl whose perpetually recumbent and shapely body graces the pictorial portion of the current advertising of the American Gas Association. For while she has been seduced into a somnolent acceptance of the slothfulness that only advertising copy writers can adequately portray as the ultimate goal of feminine emancipation, she must have been troubled at times, as we have been, by a certain elusive vagueness on the practical ways and means by which her triumph over toil is to be accomplished. In the absence of any heartening communiqué from the silent laboratories in which the gas engineers are fighting their grim campaign in her behalf, there have been moments when her own morale could have sagged. And mayhap the ominous rumble of a cast iron skillet or the sharp staccato bursts of the dover beater have aroused in her something akin to terror from her infinite varieties of ease.

But now she can be told that succor is on the way, and the immobile, dental smile that bisects and broadens her lovely face need never be clouded by a trace of concern over cookery. Frozen foods and desiccated dehydrates are to the rescue.

Old timers wedded to their archaic conceptions of food preparation may reflect that after all even these comestibles require some cooking, and that it matters little whether it is a frozen fish or a fresh fillet that finds its way into the pan, so long as the gas flame is lighted to prepare it for the platter. They have reckoned without the *Readers Digest* and the *Saturday Evening Post** if they allow themselves to luxuriate for long in such a secure complacency. For in the bright new world of tomorrow the jig is up for home cooked meals. The housewife is to be offered not one, but two great avenues of escape from the confines of kitchen slavery,—she may skate merrily away from this devils' island of domestic felicity on the silvery promise of complete, pre-cooked meals delivered in a frozen state at the kitchen door,—or she may float away without moving a finger, the while husband and children regale their palates and fortify themselves for the few remaining trials of a post-war world on the contents of tiny concentrated capsules of dehydrated fruit and vegetables.

It is not for us to trammel this new freedom by any ukase or mandate or even hint of preference on our part. But given the choice, we will elect to travel the capsule route in preference to the frosted trail, mindful of the fact that ordering up frozen slabs of East Indian *rijsttafel* will present problems in pronunciation that only a broader and more cosmopolitan education than ours can surmount. This and the fact that a "resplendent chain of cafeterias in southern California" plans to cook food in central kitchens and distribute it on a nation-wide basis. The prospect of the Los Angeles cafeteria menu suddenly becoming the gastronomic standard of the nation is a boon that we are not yet ready to embrace.

We are well aware that these exaggerated visions are only part of a pattern of escape by which the nation seeks to remind itself that out of the tribulations of today there will be born rewards commensurate with the cost. Nobody expects all of these promises to come true; very few would want them even if they did. Yet in our opinion they pattern a trend in wishful thinking that the gas industry can ill afford to encourage. If the art of successful homemaking can be glorified only through constant harping on the theme of escape from its responsibilities and its rewards, how can the purveyors of gas as a domestic fuel look forward to anything but the ultimate liquidation of their cooking load? The industry has at various times given serious study to the inroads made on the use of gas for cooking by the widespread acceptance of small electrical appliances,—percolators, toasters, roasters, waffle irons and the like, taken along with the trend toward bird-like breakfasts of fruit, dry cereal, toast and coffee. We have listened with approval to convention speakers who have seriously advocated an advertising campaign based on this one theme alone, the revival of that old and honored institution, a real American breakfast.

The home service departments of the various gas companies are under no illusions as to the part that their activities play in their employers' operations. They are there to help women to cook,—to learn to cook better and to be proud of their culinary achievements as they progress in this ancient and honorable household art. Without being guilty of the use of the hackneyed phrase,—they glorify homemaking. Of course they are not advocates of unnecessary drudgery; and economy in the use of time, materials and even the fuel itself is all part of the message that they are patiently and brilliantly expounding day after day to hundreds of thousands of receptive feminine ears. Of all of the phases of gas promotion, we can name none that shows less inclination toward self aggrandizement, or has better grounds for justification, than that of home service. Yet the very existence of the service and the incalculably valuable good will that it has created is based on the feminine desire, not to escape from, but rather to excel in, the practice of those activities which are inalienably associated with the making of a real home.

If the kitchen of today is indeed the irksome symbol of confinement and restraint that modern escape artistry has by implication painted it, then we believe that there is little need for further research in gas cooking appliances. Just a simple fool-proof box will suffice with a rated

**Readers Digest*, Feb. 1944; *Saturday Evening Post*, Feb. 12, 1944.

Btu. input sufficient to thaw out a frozen pre-cooked cafeteria meal. And the gustatory gloom that envelops our medieval dining room will be enlightened by promises of a still brighter day, when even the capsule will be outmoded, and the tired palate and the well traveled esophagus can rest. Ham and eggs *en essence*, by intravenous injection.

Backdown

IN commenting on Economic Stabilizer Fred Vinson's "two per cent directive" in a recent editorial (GAS Feb. 1944, p. 10) we voiced the opinion that "in its raw and unmodified form the scheme will be a failure" as far as the manufacture of gas appliances, our principal concern in the matter, was concerned. Apparently the economic czar now sees eye to eye with us in this, although we are not advised that he has had our views brought to his attention. In a press release aimed at the Sunday, January 30, newspapers the stabilizer called the whole directive off except in its application to the low cost wearing apparels field.

"This directive," says the release, "has been widely misunderstood," and "Furthermore it was intended to apply primarily if not exclusively to the field of basic textiles and apparel."

Widespread misunderstanding on the part of many industries consisted chiefly in taking the directive to mean what it said, and the objections that were raised came from the announced threat that WPB would use its "full legal authority" to carry through a production program wherever required.

We have no quarrel with the decision of the economic stabilizer to modify the harsh structures of his first edict. But we do object to, and we believe all industry has a right to resent, the technique of which this is a classic example. It is the policy of the big bluff and bluster first, followed by the necessary quiet adjustments to the realities of the situation that alone make the war-time edicts workable.

With government agencies swarming with legal practitioners, all of whom must regard themselves past masters in the art of framing the properly worded order, balanced with superb equilibrium on the outer fringe of the law's most elastic limit, there should be no necessity for widespread misunderstanding of either the objectives or the methods which they promulgate. Only a government agency would try to stimulate the production of kiddies' coveralls by means of a thumping mandate broad enough to embrace the manufacture of water heaters. And only a government agency would blandly characterize a literal interpretation of its orders as a misunderstanding on the part of those affected.

Close Call

WE BELIEVE that the OWU has proceeded with both competence and long range thoroughness to make the most of an extremely delicate and critical situation brought about by the shortage of natural gas in the Appalachian area. Despite an extra 6 billion cu. ft. of gas in storage at the beginning of the winter, the OWU early foresaw for that area a dangerous curtailment before the winter was over, and on the first of November last year issued its Directive 1 to Order U-7 ordering all industrial consumers with standby facilities burning residential fuel oil cut off from gas supply to the limit of their oil standby. This was followed with appeals to residential and commercial consumers to conserve natural gas in every way possible, a campaign which the utilities in the area supported. On January 9 the OWU expanded its ban on deliveries of natural gas to include all industrial and commercial users having standby facilities capable of burning any type of fuel with the exception of LP-Gas. On February 5 WPB Chairman Donald M. Nelson called on all natural gas companies in the region to deliver a personal message from him to every factory, store and residential consumer, urging full cooperation in a voluntary conservation and curtailment program. On February 9 sixty natural gas distributing companies in a wider area, from Missouri east to Ohio and Kentucky, were forbidden to make deliveries where any other fuel standby could be used, with the exception again of LP-Gas. Supplementing this latest order (Directive 1-A of U-7) a special directive was addressed to the Panhandle Eastern Pipe Line Co., requiring it to move all of its surplus gas into the Appalachian area.

The situation as of the middle of February was that supplies were still dangerously low, with little likelihood for any improvement in the situation before the middle of March. But unless unusually severe late winter storms send the residential and heating load to midwinter peaks, there is prospect that the industry will come through this, the most trying three months in its history, without serious interruptions of domestic or essential war production service.

Deferred Maintenance

THE railroads in renewing their request for tax exemption for special deferred maintenance accounts are bringing to issue a point which we have for some time contended should be a matter of equal concern to the gas industry. The argument that the railroads advance is that while the ICC permits them to lay away money that material shortages prevent them from using on normal upkeep, the Internal Revenue Bureau holds such funds fully taxable.

Commenting on the reasonableness of the railroads' contention, the Wall Street Journal says:

> Whenever maintenance actually performed falls short of making good current wear and tear and the revenue bureau refuses to exempt reserves against maintenance from taxation as income, it follows that the government is levying on a greater sum than true net income . . . In any case the taxation of property deterioration as though it were income is wrong.

We sometimes question whether the government is interested in any trifling consistency in policy that might result in some loss in tax revenue. But certainly no bureau can afford to condone the existence of a technical flaw in its concept of taxable income. The position of the railroads and their petition for relief resulting therefrom is a practical parallel to that of the gas utilities with respect to their deferred maintenance expenditures.

We have heard that the problems of deferred maintenance may be taken into consideration when Congress gets around to framing the next tax bill. But since the burden of agitation on behalf of this remedial measure has been carried by the railroads, it may well be that they will be given exclusive consideration unless the gas utilities continue a vigorous parallel presentation on their own behalf.

DOMESTIC GAS RESEARCH

Automatic Oven and Broiler Ignition

For the Post-War Gas Range

By R. M. CONNER

Director, American Gas Association Testing Laboratories

POST-WAR models of domestic gas appliances will be far superior in performance and construction and will undoubtedly afford greater convenience features than their pre-war counterparts. This is by no means a vague prediction. It is backed by the most extensive research program ever undertaken by the American Gas Association and is rapidly approaching realization in practical improvements and innovations based to a great extent on results obtained from these studies.

Objectives of the Research Program: The objective of this broad program of domestic gas research was clearly defined by Ernest R. Acker, president of the American Gas Association. It is our intention, he pointed out, "to aid in the development and improvement of equipment to be manufactured in the post-war period in order that the public will be supplied with new types of appliances incorporating the latest features of design and the most effective means of fuel utilization." Despite the high standards and high levels of performance and construction manifested by contemporary (pre-war) models of gas equipment, this objective is not one of complacency. Rather, it is a far-sighted program designed to elevate further the present high standard of domestic gas appliances and to maintain their superiority over competitive equipment.

Evidence of the importance which the gas industry attaches to its domestic gas research program is provided by the procedure adopted for its planning and supervision. These details are in the hands of the Committee on Domestic Gas Research of the American Gas Association, of which Everett J. Boothby, vice president and general manager of the Washington Gas Light Co., and F. Marion Banks, vice president of the Southern California Gas Co., are chairman and vice chairman respectively. The committee is composed of leading gas industry executives representing both utility companies and manufacturers. In addition, five technical advisory subcommittees are available to provide technical supervision over the many details necessary in outlining actual conduct of the investigational work required. Composed of representatives of gas companies and manufacturers alike, who are closely in touch with the fabrication and utilization of domestic equipment, their practical knowledge has proved most valuable in conduct of the entire program. These groups are closely in touch with the Testing Laboratories of the American Gas Association to which have been assigned the task of carrying out the various projects under supervision of Mr. Boothby's committee.

When domestic gas research was first undertaken in 1935 it was devoted to a study of gas ranges to secure fundamental scientific information for their further development and improvement. From this start the Committee on Domestic Gas Research has greatly extended its original plans. Results of initial studies made by the Laboratories proved so valuable that similar investigations covering domestic gas water heating and atmospheric gas burner design were later authorized. Direct gas space heating and central space heating research represent more recent developments. Conduct of all of these studies was assigned to the Testing Laboratories under the Committee on Domestic Gas Research, assisted by its technical advisory groups.

Technical Bulletins: Since the original investigation on domestic gas ranges was undertaken, 11 technical bulletins have been published and widely distributed throughout the industry. Four of these are devoted to domestic gas cooking. Three refer to water heaters and four to gas burner research. The latter project has come to assume special significance in view of the important part which burners exert in the performance of all types of equipment. Three additional bulletins have recently been supplied to the committee and they are expected to be available shortly in published form.

Within the last year the program, which has been under way since 1935, has been greatly enlarged and its progress accelerated. The necessity was fully realized of obtaining at the earliest possible date scientific information which could be utilized in the further improvement of equipment for the post-war period. Unless this was forthcoming rapidly, the resulting benefits could not be practically realized. In view of these circumstances the projects then under way were critically reviewed and revised and extended as necessary. Funds were provided to permit the vigorous prosecution of the work on a basis of approximately four times that which had previously been possible. To accomplish the results desired by the committee added greatly to the responsibilities of the Testing Laboratories, particularly in view of existing war commitments. By reassignment of duties and by augmenting its staff with additional technical personnel, the enlarged program has been fully under way now for several months. Extent of the progress made may be judged from the printing of four technical bulletins within the past few months, with three others shortly to be released. A wealth of information has thus been provided which it is confidently expected will be reflected in the character of the equipment later to be available.

Flash Tube Ignition Study: One of the most important practical results of this intensified program of fundamental research is the development of improved automatic flash tube

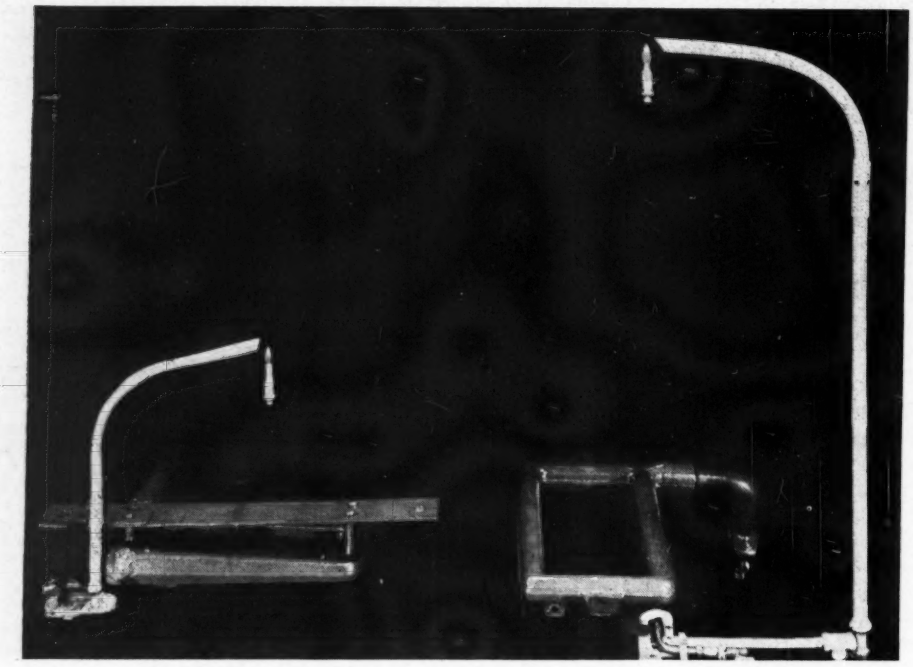


FIG. 1. Automatic flash tube ignition system for separate high broiler (left) and low oven (right) ranges for manufactured gases.

ignition systems for range oven and broiler burners. Although automatic ignition of such burners has been available for several years and has been featured on Certified Performance ranges, it has never been widely employed. In these "CP" models ignition is generally accomplished by a constantly burning pilot placed close to each oven or broiler burner. Hence for a divided top range with a low oven and separate broiler at least four pilots would be required. While such an arrangement may be employed in some instances, others arise where cost of operation overshadows the added convenience factor. An ideal ignition system would appear to consist of an arrangement where only a single constantly burning pilot would suffice to effect ignition of all burners of a gas range. This has been made possible by recent research, results of which are summarized in Research Bulletin No. 17, *Automatic Flash Tube and Pilot Ignition of Oven and Broiler Burners on Manufactured Gas*, published in August, 1943, and in Research Bulletin No. 21, *Single Point Flash Tube Ignition for Oven and Broiler Burners*. The first has already been widely distributed. The second is scheduled for early publication.

Automatic ignition of gas range top burners by means of flash tubes from a single pilot has been widely and successfully used for many years. Application of this method for oven and broiler burner lighting, however, has been quite limited in comparison. Some attempts have been made to provide automatic ignition on cabinet type ranges by using an adequate length of flash tube extending from the centrally located top burner pilot through the wall between the top section and combined broiler and oven compartment. This arrangement was not very reliable. A trailer-arm in place of the long flash tube was next provided. It, however, also failed to meet popular acceptance. About this time table-top ranges were introduced on the market. The need for a vertical flash tube section in addition to the horizontal component involved new problems that were not apparent with top burner lighting. While a few table-top models were constructed with flash tube lighting systems for oven and broilers, their use was limited and their operation was only moderately successful. Consequently, to meet the demand for positive and rapid automatic ignition for general application to oven and broiler burners, the industry resorted to the use of separate constantly burning pilot lighters in addition to top burner pilots.

Renewed interest in the development of single point flash tube ignition for oven and broiler burners was brought about as a result of publication of Laboratories' Research Bulletin No. 14, *Fundamentals of Automatic Flash Tube Lighter Design*, in October, 1941. This bulletin provided the first scientific treatise and fundamental data on the principles of flash tube operation. While it covered top burner lighting quite fully, it was evident that much further study was necessary to make practical their application to ovens as well. In view of the fact that automatic ignition from a single point represented an ideal system and one affording most economical service, research on automatic ignition of oven and broiler burners was undertaken.

Considering previous experiences with oven and broiler burner flash tube ignition systems designed for use with manufactured gas, it appeared logical first to determine their governing principles of operation with a view to their improvement and then, if possible, to extend these principles so that flash tubes could be used with all city gases. It was found possible to obtain ignition of a lighter port, using manufactured gas, with a 10-ft. vertical tube ¾ in. in diameter, or 6 ft. of ¾ in. diameter coiled tubing formed into two complete loops. While these designs are obviously far beyond practical requirements of a modern gas range, they serve to demonstrate possibilities of automatic ignition with any reasonable length of tubing providing the diameter of the tube is adequate.

Other Factors

Among other factors affecting operation of flash tubes with manufactured gas are shape of tube, radius of curvature (between vertical and horizontal components), relief openings in the flash tube wall, and use of restrictors, as well as gas input to lighter port. Two systems designed from the fundamental principles revealed in this study are shown in Fig. 1. The automatic flash tube on the left is designed for use with a separate high broiler with manufactured gas, while that on the right is for a low oven burner. Turning on the burner valve admits gas to the lighter port which passes up through the flash tube together with some entrained air. Ignition of this gas-air mixture is effected by the constantly burning pilot which also serves as the top burner pilot, with flame flashing down the tubes to the lighter port. In the case of the oven ignition system, the lighter port serves to ignite the gas from the trailer-arm ports which in turn ignites the pilot of the horseshoe safety pilot. In case of the broiler ignition system illustrated, a trailer-arm was not necessary, as the flash tube could be inserted through the top of the broiler compartment. Following actuation of the automatic pilot, gas is admitted to oven or broiler burner and ignited by the flame of the automatic pilot.

A cross-sectional view of a flash tube ignition system for a conventional oven burner is shown in Fig. 2. Vari-

ous design factors briefly listed above are clearly illustrated therein. Although dimensions are given, it is important to point out that additional study may be necessary before similar application can be made to a given line of gas ranges. Nevertheless this system, as well as those shown in Fig. 1, was installed on contemporary models and tested for an extended period under conditions simulating extreme field conditions, at high and low gas pressures, and at both room and elevated operating temperatures. In each instance, positive and satisfactory ignition was obtained.

Preliminary experiments with natural gas flash tubes revealed that ignition could be obtained with natural gas provided the diameter of the tube was much larger than that required for manufactured gas. It was also shown that a higher gas input to the lighter port was necessary, the minimum gas rate being too high for practical application.

In an effort to lower the minimum input rate and increase the effective operating range of flash tubes for use with natural gas, attention was given to tubes of special design. It was found that drilled openings along the entire length of tube increased the operating range and gave performance superior to that of plain tubes but still not entirely satisfactory. Additional relief openings were therefore added until a continuous slot in the tube wall extended vertically from its base and for the entire length of the horizontal section on its under side. These slotted tubes produced excellent performance for both natural and manufactured gas, making it possible to use tubes of less than ½ in. internal diameter for low oven burner ignition.

A satisfactory ignition system incorporating a continuous slot for use with a natural gas low oven burner is illustrated in Fig. 3. This tube has an overall height of 24 in. which is undoubtedly more than ample for contemporary low oven constructions. It will also be noted that a means is provided to shut off the lighter port flame after oven burner ignition is effected. Although other devices than the solenoid indicated in this diagram may be employed, this means for automatically shutting off the lighter port gas supply was provided in experimental tests for the purpose of improving overall combustion characteristics.

With the ignition system shown in Fig. 3, when the burner valve is turned on, gas is admitted to the lighter port and ignited by flash back from the top burner pilot. The lighter port flame then ignites the gas from the carryover arm on the automatic pilot. The latter, when actuated, admits gas to the oven burner and simultaneously closes off gas to the lighter port. A manual push-button lighter port control supplying gas to the lighter port until ignition is effected may also be employed. It may be appreciated, however, that such a device is not fully automatic. When manufactured gas is used, satisfactory performance can be obtained by use of an enlarged chamber at the bottom end of the flash tube. A flash tube for application to a separate high broiler for natural gas operation is illustrated in Fig. 4.

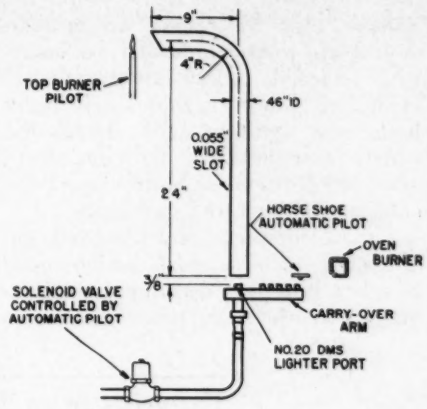


FIG. 3. Flash tube and accessories for low oven burner ignition on natural gas including means for shutting off lighter port flame after oven burner ignition.

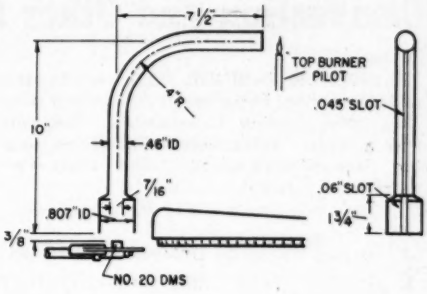


FIG. 4. Slotted type flash tube and assembly for separate high broiler ignition on natural gas.

Verifying the applicability of slotted type flash tubes under conditions comparable to those to which they would be subjected in the field, tests were made with three domestic gas ranges in which these tubes were installed for automatic ignition of low oven and separate high broiler burners on both natural and manufactured gases. The test installation for low oven burner ignition on natural gas made use of automatic means for closing the gas supply to the lighter port after ignition of the oven burner. Observations made on these installations under various conditions of tube temperature and gas pressure revealed completely satisfactory performance.

Full application of this new devel-

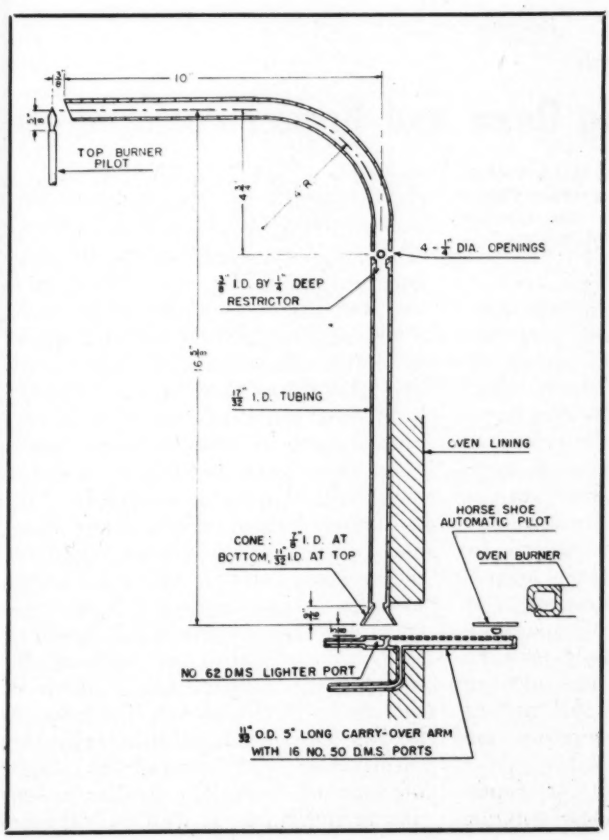

10"
TOP BURNER PILOT
4 - 1/4" DIA. OPENINGS
3/8" I.D. BY 1/4" DEEP RESTRICTOR
17/32" I.D. TUBING
OVEN LINING
HORSE SHOE AUTOMATIC PILOT
CONE: 1/2" I.D. AT BOTTOM, 11/32" I.D. AT TOP
OVEN BURNER
NO. 62 DMS LIGHTER PORT
11/32" O.D. 5" LONG CARRY-OVER ARM WITH 16 NO. 50 D.M.S. PORTS

FIG. 2. A flash tube ignition system for low oven burner on manufactured gas.

opment may by reason of present-day world-wide conditions be somewhat retarded. There is every reason to believe, however, that single point flash tube ignition will shortly be widely accepted and thereby afford another distinctive improvement to enhance the post-war gas range.

For a complete and detailed analysis of the variables which must be taken into consideration for adapting automatic flash tube ignition to domestic gas ranges, reference should be made to Research Bulletin No. 17, *Automatic Flash Tube and Pilot Ignition of Oven and Broiler Burners on Manufactured Gas, and* to Research Bulletin No. 21, *Single Point Flash Tube Ignition of Oven and Broiler Burners.* They contain a wealth of information, including much original data not previously available which should prove of great practical value to gas range manufacturers.

Excerpts from Reports Presented Before AGA'S Cleveland Conference on Domestic Gas Research

Gas Water Heating Research

Combustion and Other Performance Aspects

FRANKLIN R. WRIGHT, manager, Testing and Inspection Departments, American Gas Association Testing Laboratories. Excerpts from a report, "Fundamental Gas Water Heating Research—Combustion and other Performance Aspects."

THE gas industry prossesses an ideal heating fuel, and contemporary gas water heaters are the most all round satisfactory and economical means of providing hot water heating service for domestic use. Up until the United States entry into World War II, sales of gas water heaters was on the increase with approximately 1,200,000 units being sold in the United States in 1941, an increase of approximately 380,000 over the number sold in 1939.

In spite of the foregoing optimistic picture, the growth in sales of competitive equipment has also been on the increase, with the sale of electric water heaters, for example, more than doubling from 1939 to 1941. It also seems reasonable to assume that the post-war period will see greater efforts on the part of our competitors to make inroads into the gas water heating market. Those in the gas industry, therefore, who were responsible for initiating the present program of domestic gas research, as well as those responsible for carrying it forward, are to be congratulated for their foresight and initiative which are characteristic of the industry's history. Since the year 1926 the American Gas Association's Laboratories have been almost continuously engaged in research relating to gas water heating. Until a few years ago when the Committee on Domestic Gas Research was formed, this research was based primarily on the preparation and revision of approval standards for the Association's requirements committee.

In 1940 Bulletin No. 9, "Fundamentals of Domestic Gas Water Heating," was issued as the first publication covering an extensive program of gas water heating research sponsored by this committee. Bulletins No. 12, "Principles of Gas Storage Water Heater Design for Maximum Hot Water Delivery," and No. 19, "Effects of Cold Inlet Water on Performance of Automatic Storage Gas Water Heaters," have been published. Additional studies are presently in progress.

Essential facts disclosed by water heating projects completed to date as covered by Chapter V on Combustion Chambers and Flueways of Bulletin No. 9, as well as all of Research Bulletins Nos. 12 and 19, are summarized in this paper with a view of presenting essential facts of practical significance in improving water heater studies are presently in progress.

Factors of combustion chamber design influencing combustion characteristics and heat transfer are considered. Flue design and baffling are discussed in relation to combustion, efficiency and cold water inlet temperature, including factors affecting flue capacities.

Data are presented showing effects of cold water inlet on combustion, burner operation, flue capacities, efficency and condensation, together with practical methods for overcoming adverse effects in water heater design.

Design features influencing stratification in water heater storage vessels, advantages and disadvantages of stratification and methods of overcoming it are considered, including its effects on percentage of stored water deliverable at a usable hot water temperature.

Design and location of dip tubes for maximum hot water delivery are fully discussed, including effects of introducing inlet cold water through drain connections.

Gas Cooking Research

Factors Affecting Oven and Broiler Performance

K. R. KNAPP, chief engineer, AGA Testing Laboratories. Excerpts from a report "Practical Phases of Fundamental Gas Cooking Research on Range Ovens and Broilers."

ABILITY of modern gas range ovens to perform to the best advantage the service demanded of them, depends on a variety of factors which must be properly coordinated to secure best results. Some may be solved by following generally accepted methods of oven design. Others are of a much more complex nature and require thorough scientific analysis for their solution. Among these may be mentioned such features as speed of oven heating, economy of operation, maintenance of low surface temperatures, cooler kitchens, and uniform oven heat distribution. All are intimately related with aeration and venting of the oven.

Recognizing the need for fundamental information on these complex elements of performance and design, the Committee on Domestic Gas Research of the American Gas Association included intensive studies of ovens and broilers as a part of its program on Domestic Gas Cooking Research undertaken at the Testing Laboratories in 1935. Results have been made available from time to time through published bulletins, the first having been issued in 1936. Three others have since been published, and two more will shortly be released.

Earlier studies on gas range ovens and broilers were devoted largely to determining effects of flue losses, methods of insulation and input rates on preheating speeds and gas consumption for preheating as well as for maintaining temperatures. Much of the data developed applied also to broiler sections. In addition, valuable information was secured on effects of type of flame on broiler speeds and temperatures as well as influence

of temperature on quality of broiled meat. All are covered in Bulletin No. 7.

In Bulletin No. 8, which represents the second devoted to gas cooking research, methods of improving fuel economy and preheating speeds by controlled aeration and venting through means of oven constructional features are treated fully. From data obtained, methods are developed for so proportioning various oven parts affecting secondary aeration and venting of flue products as to secure the greatest speed and economy of operation from an individual range. Relationships between excess air and essential performance features are established. Additional studies on broiler sections are also covered in this bulletin, including data on design of aeration and venting features of different types as well as their performance characteristics.

Bulletins Nos. 14 and 17 comprise the latest publications dealing with gas cooking research. Both are devoted to flash tube lighting. Bulletin No. 17, published late in 1943, deals with flash tube ignition of oven and broiler burners from a constant burning top pilot using manufactured gas. It also presents practical methods of application to various types of contemporary ovens.

After this introduction various important factors affecting oven performance are briefly discussed and the manner in which constructional features affect them described. Relations between excess air and such factors as area of secondary air openings, free openings through oven bottoms and interior flueways and flue outlet area are explained and a formula developed for expressing this relationship. Its application in the aeration and venting of ovens is also outlined.

Results of studies of insulating materials are given, showing the effects of thickness and density on preheating speed and maintaining rates as well as influence on surface and room temperatures.

Relationships are outlined between broiler speed and temperature, as well as the influence of type of burner and use of radiants on the broiler product. Effect of temperature on the broiler product is fully described.

Several applications of flash tube lighters to ovens and broilers, embodying results of studies made using manufactured gas are illustrated and discussed. Refinements in flash tube oven lighting applications resulting from additional studies on natural gas are also included.

Conference Comments on Domestic Gas Research

DIGEST OF remarks made by EVERETT J. BOOTHBY, chairman, AGA Committee on Domestic Gas Research and FRANK H. ADAMS, general manager, Surface Combustion, Toledo at the Research Luncheon, Hotel Statler, Cleveland, Feb. 17 in connection with the AGA Technical Conference on Domestic Gas Research.

Mr. Boothby: The results of the research work accomplished to date speak for themselves. The purpose of the conference is summed up very well by a prominent gas range manufacturer who said, "I hope the conference will bring about an exchange of views among the engineers who will be present. The book of knowledge concerning the fundamentals of gas utilization is all too thin." The information brought out during the conference will in no way encroach upon the patents held by manufacturers.

Mr. Adams: It is extremely important for everyone to know the policy of the gas industry in reference to research—how much of it is being done and whether or not it matches the research programs of competing industries. The American Gas Association is now appropriating some 40% of its income for research of various types.

The principal objective of this domestic gas research program is to better gas appliances. In carrying out the objective we face a double challenge. First, we must make sure the work is technically sound and, it must not only be usable but it must be used. The gas companies must support this program and take such action as will make it thoroughly effective.

Four fundamentals that should be included in a long-term consideration of gas appliance research, are as follows:

1. Gas cannot be sold except through appliances. These determine type and quality of service.

2. Utilities have the greatest stake in research, because of their huge investment.

3. Utilities need a sound, loyal appliance manufacturing industry. There are too many appliances built by companies as a sideline—too many complaints as a result of poor appliances.

4. Development of appliances can best be done by manufacturers.

Gas companies should support the appliance manufacturers who do research work. Top management needs to be sold on this. The volume of sales of gas appliances is much too low for a healthy appliance industry and both the appliance manufacturers and the utilities should be concerned about this situation.

What is the best policy to pursue in research? It is not a question of fundamental or applied research, but a matter of stimulating all manner of research throughout the gas industry and bringing forth, as a result, values measured in tangible form.

Gas Burner Design

Ports, Flame Characteristics, Mixing Tubes

F. E. VANDAVEER, assistant director, AGA Testing Laboratories. Excerpts from a report, "The Technique of Advancing Atmospheric Gas Burner Design—Burner Ports, Flame Characteristics, and Mixing Tubes."

ATMOSPHERIC gas burners are an essential part of every domestic gas appliance as well as many commercial and industrial appliances. They vary in size from a single port pilot burner a fraction of an inch in diameter and consuming little more than 100 Btu. per hr. to multiport burners several feet long and consuming tens of thousands of Btu. per hr. They are made in nearly every conceivable shape fitted to the particular heating job to be done. A few contemporary models of different sizes and types are shown in illustrations. They perform efficiently such varied tasks as top burner cooking, broiling, baking, water heating, central and space heating, refrigeration, ironing, clothes drying, summer air conditioning and many others. Improvements in burners have either preceded or kept pace with every new gas appliance development.

Research on atmospheric gas burners has accordingly represented a major portion of assignments made by American Gas Association Committee on Domestic Gas Research to its Laboratories from the time its program of fundamental research was undertaken. The first publication on this subject was issued as Bulletin No. 10, Research in Fundamentals of Atmospheric Gas Burner Design, in 1940. Bulletin No. 13, Fundamentals of Design of Atmospheric Gas Burner Ports, followed in 1942. Bulletin No. 16, Relation of Burner Volume to Ignition and Extinction Characteristics of Gas Range Top Burners, was published in 1943, while Bulletin No. 20, Gas Burners Utilizing All Air for Combustion as Primary Air, the fourth of the series, is just off the press. Other research projects on burners, some of which are well advanced, are being diligently studied with results to be published at a later date. They include:

(*Turn to Page* 21)

1. Further investigation of 100% primary air burners.
2. Mixing tube design.
3. Control of primary air with and without air shutters.
4. Small tubular burners with combustion taking place inside the tube.
5. Burners utilizing no primary air, producing non-luminous short blue flames.
6. Principles for designing improved luminous flame domestic burners.

In all of this work the primary objective has been to establish fundamentals of burner design which may be most generally and widely useful to designers, engineers and manufacturers of gas appliances. In some of the more difficult projects, it will be necessary to test out the theories developed by making preliminary models of burners. Also correlation of work on various parts of a burner, such as on ports and mixing tubes, will be necessary before a finished product can be evolved. Nevertheless with fundamentals of burner design set forth, they may be usefully applied to the many thousands of types of burners being designed and manufactured. It is essential, however, if the gas industry is to secure the greatest benefit, that men and women capable of reading and understanding these fundamentals and applying them in designing burners and appliances be employed and encouraged by appliance manufacturers.

The technique of advancing gas burner design is not confined to any single agency. Notable contributions have been made by the Bureau of Standards, appliance manufacturers, and others. A particularly effective method has been the gradual raising of American Standard approval requirements with which over 95% of all appliances sold in recent years have complied. Many manufacturers have made improvements in burner design in order to meet these standards.

The remainder of the paper is concerned with the most important items of burner port design. Effect of drilled port size, port depth, port spacing, ribbon and slotted ports and fuel gases on burner performance and a new formula for calculating flow of air-gas mixture through ports are given. New mathematical formulas for calculating flame characteristics of inner cone and outer mantle flame height are discussed. Port design to prevent flash-back is summarized. Generally accepted dimensional limits for mixing tube design for good primary air injection as well as some interesting research in new directions are briefly reviewed.

Gas Burner Design

Optimum Volume and Noise of Extinction

K. H. FLINT, assistant chief research engineer, and ROBERT C. WEAST, Ph. D., AGA Testing Laboratories. Excerpts from a report, "The Technique of Advancing Atmospheric Gas Burner Design—Optimum Volume and Noise of Extinction Characteristics."

IMPROVEMENTS in the design and performance of gas burning equipment rest largely on the solution of problems affecting gas burner design. Accordingly it is essential that research be directed toward these problems so that full scientific data may be made available for incorporation in new burner developments. Two of the more important objectives of this research are the elimination of residual gas odor after extinction of gas burner flames and the elimination of burner noises.

Burners of the Bunsen type have at least six potential sources of noise: namely, flame noise flash-back or lighting back, orifice noise, air aspiration and mixing noise, noise of ignition, and noise of extinction.

The principles and methods of correction of the first five are reasonably well understood. As a consequence, they are given only brief treatment in this paper. Although noise of extinction is easily recognized, it is not always readily eliminated and the methods for its correction have not been thoroughly understood.

Noise of extinction can be eliminated by preventing explosive mixtures which are formed in the mixer tube after gas shut-off from reaching gas burner ports before its flames extinguish. This may be accomplished by retarding the flow of the explosive mixture without impairing the performance characteristics of the burner. Small burners can be designed to eliminate noise of extinction by relating a mathematical expression to the primary air injection and to the input rate.

Properly adjusted contemporary gas burners do not liberate odors after gas shut-off.

It is possible to design small volume light weight burners which retain satisfactory performance characteristics in addition to eliminating the possibility of noise of extinction or liberation of odors after gas shut-off.

Fuel Efficiency Coordinators Named by Ickes

ACCORDING to an announcement recently issued by Secretary of the Interior Harold L. Ickes, a district engineer and eight more coordinators have been appointed by Dr. R. R. Sayers, director of the Bureau of Mines, in preparation for carrying the bureau's fuel efficiency program into the industrial and commercial plants in metropolitan areas within the next few weeks. There are now 12 coordinators and thousands of volunteer regional engineers enrolled in this program directed by the National Fuel Efficiency Council in cooperation with the Bureau of Mines, as a part of the government's critical resources conservation campaign.

The district engineer named by Dr. Sayers is John G. Mingle of the Bureau of Mines; he has been assigned to Indianapolis, Ind., and will supervise the program in Michigan, Ohio, Kentucky, and Indiana.

The new coordinators and their headquarters cities are Merrill F. Blankin, president of the American Society of Heating and Ventilating Engineers, Philadelphia, Pa.; Edward L. Crosby, of the Henry Adams Co., Baltimore, Md.; P. W. Thompson, vice president in charge of engineering for the Detroit Edison Co., Detroit, Mich.; William G. Christy, smoke abatement engineer for the Hudson County Board of Health and Vital Statistics, Jersey City, N. J.; Sam Dalton, of the Dalton Coal & Materials Co., Columbia, Mo.; F. K. Prosser, coal traffic manager for the Norfolk & Western Railway Co, Roanoke, Va.; Albert L. Maillard, of the Military Chemical Works, Inc., Pittsburg, Kan.; and Linn Helander, head of the mechanical engineering department, Kansas State College, Manhattan, Kan.

Committees of engineers outstanding in the field of fuel utilization, representing each of the major fuel and allied industries, are preparing informational quiz sheets for use in the program.

The regional engineers soon will start visiting plants in their sections. Serving without pay, these engineers, who are among the nation's leading fuel specialists, will request that the management of each company whose plant they visit sign a pledge to cooperate in saving fuel. Following a survey of the plant with a company designated "waste chaser," changes to promote efficiency will be planned. Other regional engineers will visit the plant later to offer further assistance and to note improvements made.

GAS-FIRED RADIANT HEAT

Speeds Up Repairs in the Shops of Pan American Airways

By F. K. WHITESIDE
Engineer of Industrial Gas Utilization,
The Brooklyn Union Gas Co., Brooklyn, N.Y.

AN unusually clear example of the speed and efficiency of radiant heating is furnished by the large gas-fired salt bath aluminum heat treating furnace in the new shops of Pan American World Airways at La Guardia Field, New York's Municipal Airport. Here the famous Clippers and other large flying boats are thoroughly gone over and repaired between their trans-Atlantic flights.

Realizing the advantage of being able to anneal and harden the aluminum alloy parts used in the repair work with minimum delay, Pan American incorporated in the plans for its new shops a salt bath heat treating furnace capable of handling sheets up to 14 ft. long and 4 ft. wide. As all the equipment installed in these new shops is of the most modern type, it was only natural that the finest in heat treating furnaces should be selected.

After giving due consideration to the merits and costs of various furnace designs and heating media, Pan American decided upon a gas-fired unit equipped with radiant burners. Cost studies indicated that gas fuel offered the greatest economies, both in operation and maintenance. It had the additional advantage of being ideally suited to automatic operation and temperature control. The intermittency of its use was also a factor governing the fuel choice. While pot furnaces of this same general size, shape and purpose are now in existence, both gas-fired and electrically heated, it is believed that none other embodies this particular advanced method of gas heat application.

The pot containing the salt bath is 14 ft. long, 2 ft. 6 in. wide, and 5 ft. deep on the inside. It is constructed of 1¼ in. firebox steel with double welded seams. Around the top of the pot is welded a 7-in. structural steel channel with the flanges turned downward. The outer flange of this channel fits into a sand seal at the top of the furnace setting. The pot weighs about 5500 lb. and holds, when full, 10 tons of salts. A mixture of sodium and potassium nitrates, with a melting point of 425° F., is used.

The operating temperature ranges between 650° F. for annealing, and 920° F. for solution heat treating.

Radiant burners selected: Since the furnace is used intermittently as the need arises, the time required for heating up is of considerable importance. This requirement was one of the principal factors which brought about the selection of radiant burners. Another determining factor was the necessity of obtaining absolute uniformity of heating. To satisfy these requirements, heating by a multiplicity of radiant burners was decided upon. Since 70% of the area of the pot surface is in the two sides, and since the width is quite small as compared with the length and height, only the sides are used for direct heat absorption from the radiant burners.

The burners which were selected for this application are the all-ceramic Duradiant burners manufactured by the Selas Co. of Philadelphia. A view of one of these burners is shown in Fig. 1. Gas and air in proper proportions for perfect combustion issue from the burner tip in a large number of small streams tangent to the burner cup. The design of the cup is such that the products of combustion swirl back toward the burner tip in sort of an involute curve. They therefore do not issue from the burner at a high velocity or in a direct straight line. Because of this characteristic, it was possible to place the faces of the burners no further than 8 in. from the pot without danger of flame impingement and hot spots. The surface of the burner cup is corrugated, and the resulting turbulence causes instant ignition and holding on of the flame to the burner tip. The combustion products soon raise the burner cup to incandescence and provide the radiant heat from which the burner obtains its name.

With this particular relation between burners and object being heated, there exists an ideal condition for heat transfer. The pot wall for all practical purposes is a black body and absorbs most of the radiant heat directed toward it. The heating source is at a relatively high temperature and is located very close to the object being heated. It was found that when heating the furnace up from a cold start to 920° F., 70% of the Btu's were effectively utilized in heating the pot

and salts. It was interesting to discover how little heat was absorbed by the furnace setting during the heating-up period. By subtracting the calculated heat in the flue gases from the remaining 30%, it was found that only 4% was unaccounted for. The greater part of this 4% was absorbed by the furnace walls and piers. Only a small portion was lost by radiation from the furnace.

Furnace Construction: For purposes of stability, the furnace side walls are constructed of 9 in. of insulating firebrick with no additional insulation. In order to contain the flues, the end walls are of insulating firebrick 13½ in. thick. The bottom is constructed of 5 in. of insulating firebrick backed up by 1½ in. of block insulation. During operation, because of the radiance from the burners, the furnace walls appear also to be incandescent, but shortly after the burners are shut off it is apparent that what appeared to be heat in the walls was but a reflection from the pot.

When designing the furnace, one of the chief causes of concern was that the salt might not be able to absorb the heat as fast as it was generated. This fear was later found to be groundless. At no time during the heating up period do the pot sides become overheated. If when the salt bath is approaching a temperature of 920° F., the burners are shut off, only by the closest scrutiny can any color be detected in the furnace or pot walls.

So complete is the absorption of heat by the salt that while heating up, the products of combustion leave the furnace at a temperature not exceeding 100° higher than that of the salt. Before leaving the furnace, the flue gases are required to travel to the bottom of the setting and thence underneath the pot to the flue openings in the end walls. The furnace therefore operates under considerable pressure; hence the need for the sand seal at the top. When at operating temperature the ends of the pot fit snugly against the end walls of the furnace, thereby preventing the products of combustion from short circuiting. The pot actually expands 1 in. in length and about 1/3 in. in height when heated.

Heat Distribution and Control: In order to obtain uniform distribution of heat, 44 Selas Duradiant burners are used, half of these being on each side of the furnace. The burners are placed in three horizontal rows spaced 15 in. apart vertically. There are eight burners in the top and center rows and six in the bottom row on each side. The burners are manifolded in eight groups of four and four groups of three, making 12 groups in all. Each group is supplied with its properly proportioned mixture of air and gas by a Selas low pressure proportional mixer and individual zero regulator on the gas line. Air is supplied by a Spencer Turbo Compressor operating at 24 oz. pressure. The gas used is a mixture of coke oven and carbureted water gas having an average heating value of 540 Btu. per cu. ft. and a specific gravity of 0.60.

The furnace has an hourly gas demand of 4500 cu. ft. and at this rate of consumption can be heated from cold to 920° F. in slightly less than five hours.

For purposes of automatic temperature control, the furnace is divided into two zones, each independent of the other. The air supply to each zone is controlled by a three-position motor operated valve actuated by a Wheelco Capacitrol. While heating up, the air valve is in the wide open position. As the required temperature is approached, the valve closes part way. When the control temperature is reached the valve closes to a minimum setting which is just sufficient to keep the burners in operation.

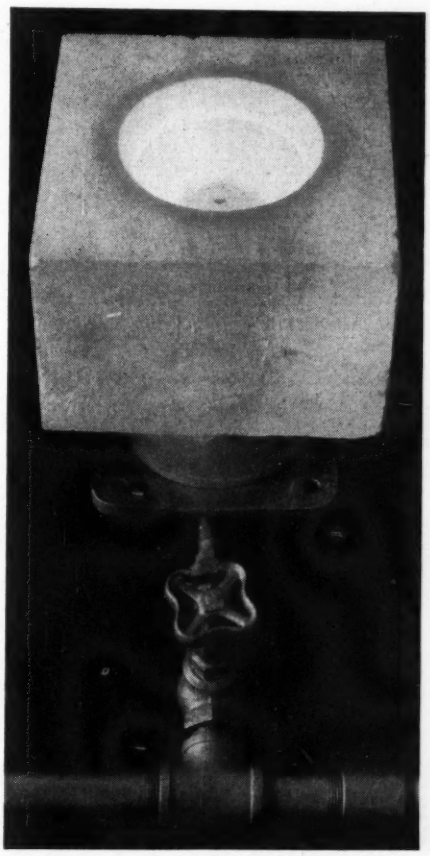


Fig. 1. Typical ceramic-cup radiant gas burner shown during throttled operation. Note the uniformity of incandescence in cup, and absence of flame beyond burner face.

North American adjustable port valves are used. They are set to give a pressure drop of 4 oz. By actually sizing the valve to the demand in this manner, the flow through the valve in its various positions can be accurately controlled.

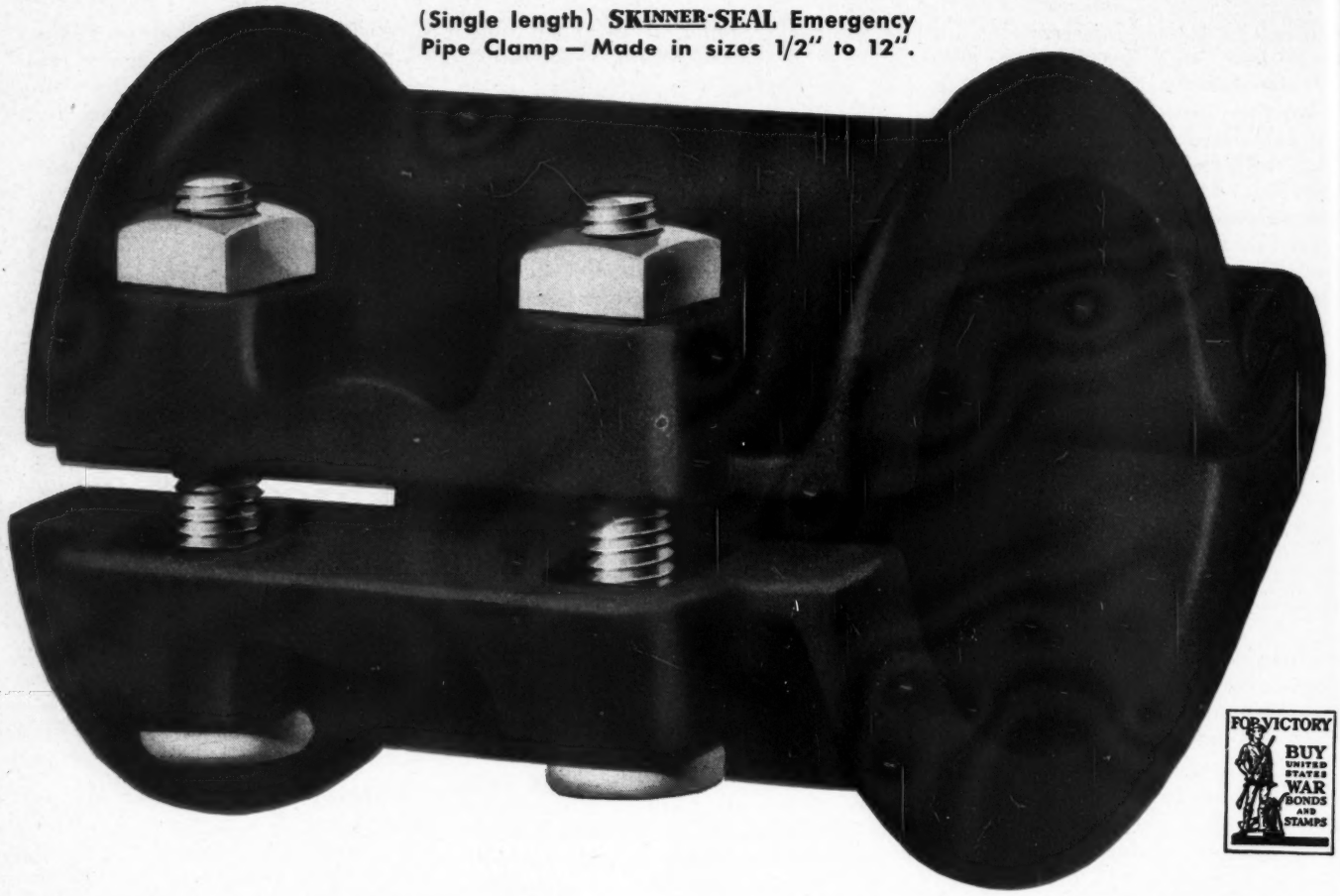
With an enormous storage of heat in the molten salt, and with a well insulated setting, it can readily be imagined that one of the main difficulties of operation is to keep the temperature from rising if the burners remain on with no work being heated in the furnace. It has been found that the salt bath temperature can be automatically controlled within plus or minus of 5° F. by operating on the lowest 12 burners. A fair idea of the magnitude of heat storage may be obtained when it is realized that it takes seven days for the salt temperature to drop 700°. The latent heat of fusion of this mass of salt is equal to the amount of heat generated by burning approximately 2000 cu. ft. of gas. This heat, of course, is released when the salt solidifies.

Lighting the Furnace: The initial lighting of a furnace of this size with completely enclosed setting and with a large number of burners presented a problem, especially since one end of the furnace is only 4 ft. from an exterior building wall. This precluded the use of a long torch inserted from the end of the furnace. A satisfactory piloting system was worked out by applying small sealed-in pilot burners to the 16 Duradiant burners at the uppermost level. These pilot burners are manifolded in groups of four and are of the premix type, using air at approximately 8 oz. pressure. They fire into specially constructed burner tunnels which line up with the lighting holes in the burner blocks.

To obtain the proper alignment of the pilot burners, to ram the tunnels and to center the pilot burner supporting brackets, a single mandrel was developed. Although experiments had indicated that these pilots would ignite the Duradiant burners without any delay, extra precautions were taken. Small baffles made of ⅛ x ¾ in. Inconel strip were placed about 1 in. in front of the face of the lighting holes so that the pilot flames are deflected downward in front of the burner cups. Ignition therefore takes place instantly. When the top row burners are lighted, the pilots are turned off. The burners in the middle and lower rows are then ignited from the burners above.

Special Design Features: In a repair shop such as that of Pan American World Airways, considerable flex-

(Single length) SKINNER-SEAL Emergency Pipe Clamp — Made in sizes 1/2" to 12".



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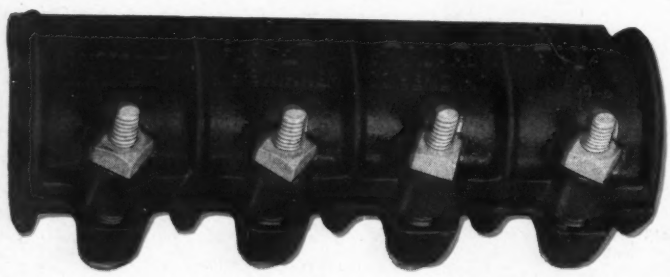

(Double length) SKINNER-SEAL Pipe Line Clamp — Made in sizes 3/4" to 7" O. D. inclusive.

★ During the present critical shortage of pipe, nothing compares with these clamps for repairing corrosion leaks and splits in services as well as mains — for all sizes of steel and cast iron pipe, 1/2" to 12". Made of malleable iron — of heavily reinforced design. Oversize high carbon-steel bolts. Hinged for simplicity of application. Furnished complete with pressure-equalizing gasket. Write for complete catalog.

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ibility of equipment is desirable. With this in mind the furnace is provided with five individually hinged and counterweighted covers. A working opening varying between 3 ft. and 14 ft. in length can be made available. These covers are constructed of 3-in. channel iron and are lined with cast insulating concrete reinforced and securely anchored in place. On the under surface of the cover, the insulating material is directly exposed to the heat. There is no steel plate there to warp and get out of shape.

As a safety feature, the gas supply to each half of the furnace passes through an Eclipse Dual-Lock valve which automatically closes upon the failure of either the gas or air pressure. When once closed, this valve must be opened manually before gas again becomes available at the burners.

It will be observed in Fig. 2 that the furnace is set in a pit. This pit is 30 in. deep. For convenience of operation, the furnace would have been sunk deeper were it not for the fact that the ground water level is exceedingly high at this location. Although the foundation pit was waterproofed, it was not considered advisable to risk serious damage to the furnace should ground water seep into the pit.

All materials for the installation were supplied by Pan American World Airways who also performed all the labor on the job with the single exception of the installation of the pot. This was done by a firm of professional riggers.

The furnace embodies one of the most recent developments in gas combustion equipment and has clearly demonstrated to Pan American the advantages claimed for radiant heating. They, in turn, have expressed their satisfaction with the installation, which promises to earn a good return on the capital invested in it. For every day that one of the huge Clippers is laid up for repairs, a loss of operating revenue results. By speeding up repairs, the furnace does its bit toward keeping the ships in the air.

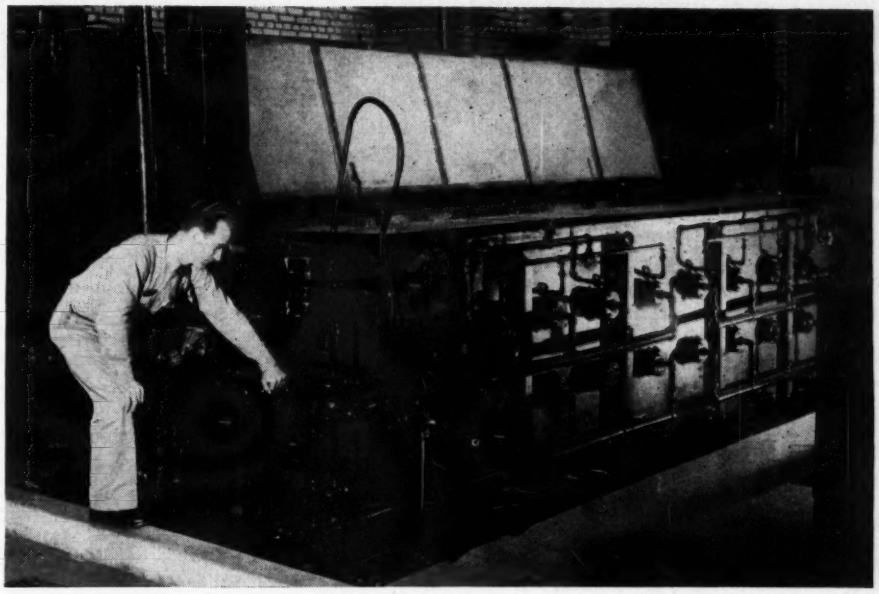


Fig. 2. Front of furnace showing burners and proportional mixers. Note pilots on uppermost burners.

McCall Awards Again Open to Home Service Workers

COMPETITION for the McCall Award, offered—for the fourth consecutive year by *McCall's Magazine*—is once again open to gas utility home service departments.

Cash prizes with plaques or certificates will be made to the five home service directors or directing heads of home service departments of those gas companies in the United States and Canada which have, in the judgment of the Jury of Awards, submitted papers indicating the most outstanding contributions to the war effort.

First prize is a plaque on which the name of the winning department and company will be engraved each year, the plaque to remain in the possession of the winning department for one year. A duplicate of this plaque will be presented to the winning department for permanent ownership. In addition an individual prize of $150 in war bonds and stamps or cash will be awarded to the Home Service Director or Directing Head of the Home Service Department.

Second, third, fourth, and fifth prizes will be framed illuminated parchments for the department, for permanent possession, and individual awards of $100, $75, $50, and $25, respectively, to the Directors or Directing Heads of the departments.

Basis and Merit Rating: The entrants will submit three copies of a report of 2000 words or less (with one copy of any appropriate photographs or illustrative material pertaining to the results, if desired) covering the following four classifications, to which the indicated weighted merit rating will be given by the judges.

1. The planned 1943-1944 Wartime Program of the Home Service Department, 25 points.

2. Activities to further better living; to further Government nutrition and food programs; other activities to maintain good-will, 15 points.

3. The actual progress made in accomplishment of these objectives in the period of June 1, 1943, to May 31, 1944, 50 points.

4. Summary of accomplishments of the average Home Service worker in this period, 10 points.

The combined ratings are designed to place large and small gas utility home service departments on an equal footing, in competition.

Each report shall have a foreword giving the following information:

1. Total number of residential customers, Dec. 31, 1943.

2. Brief description of territory served —concentrated area or scattered with preponderance of small communities.

3. Number of company offices from which the activities were carried on.

Elaborate reports are not desired; but samples of customer literature, prepared and used in the company, should be included.

The Jury of Awards will consist of five members of the gas industry, appointed by the president of the AGA. None shall be officers or employees of AGA nor associated with *McCall's Magazine.*

Filing of Reports: The contest will cover the period of June 1, 1943, to May 31, 1944. Entries should be addressed to *McCall's Magazine* Awards, c/o American Gas Association, 420 Lexington Ave., New York 17, N. Y., not later than midnight of July 1, 1944.

Presentation of the awards will be made at the annual meeting of the American Gas Association in 1944.

The Development and Future of Helium

THE discovery of helium in natural hydrocarbon gas of the United States in 1905 marked the beginning of a new era of research and paved the way for the ultimate large-scale production of the valuable element. This event had its beginning in the drilling of a gas well in 1903 at Dexter, in Cowley County, Kan. Gas came from the well and there was great rejoicing, but jubilation changed to despair when it was discovered that the gas would not ignite unless played into a fire kept going by other fuel.

A sample of this gas was sent to the University of Kansas and was found to contain over 80% nitrogen and other inerts. The residue of the sample was stored in a laboratory and lay untouched for several months. In 1905, Prof. H. P. Cady and Dr. D. F. McFarland examined the sample carefully and ascertained that it contained 1.84% helium. Thus they announced to the world that the "miracle gas" had been found for the first time as a constituent of natural hydrocarbon gas.

Early Discoveries and Applications: These findings led to tests of several gases of Kansas and other states, and the subsequent discovery of helium in a large number of the samples analyzed. But no commercial exploitation of the gases for their helium content was undertaken then.

In World War I, highly inflammable hydrogen gas was employed in inflating lighter-than-aircraft, a suicidal practice, since hydrogen-filled zeppelins which were sent over England by the Germans were ignited easily by incendiary bullets. In 1917, shortly after the United States entered the war, C. W. Seibel, an instructor in chemistry in the University of Kansas, prepared a paper entitled "Helium and Associated Elements in Kansas Natural Gas," which prompted the late Dr. R. B. Moore, then a Bureau of Mines chemist, to suggest the possibility that sufficient helium could be obtained from the nation's natural gas to replace hydrogen in lighter-than-air military craft.

Shortly thereafter an allotment of funds from the Army and Navy appropriations permitted the Bureau of Mines to launch an experimental helium-production program. Mr. Seibel, now supervising engineer of the bureau's helium plants, was drafted from his University of Kansas post to participate in the bureau's work.

During 1918 three experimental plants were constructed using oxygen-reduction methods to extract helium from natural gas. One was at Petrolia, Clay County, Texas, near the Petrolia gas field. The other two were at Fort Worth, Tex. A large quantity of helium was on a dock at New Orleans awaiting shipment to France for Allied observation balloons when the armistice was signed.

THIS SUMMARY of the story of helium, its discovery and expanding production and utilization, was prepared in connection with the award of the Army-Navy "E" to the Amarillo and Exell helium plants of the Petroleum and Natural Gas Division of the Bureau of Mines on January 19, 1944.

In 1921 the Bureau established its helium laboratory at Washington, D.C., and the research unit was opened formally in May, 1921, by Madame Curie, then visiting in the United States. This laboratory later was moved to Amarillo, Tex.

Forecasting the exhaustion of the Petrolia gas field, bureau research workers had been seeking suitable sources of helium for serving a plant to replace the Fort Worth operation. The Cliffside gas field of Texas, approximately twice as rich in helium as the Petrolia field, was chosen. A site west of Amarillo was selected as the site for what was to become the world-famous Amarillo Helium Plant of the Bureau of Mines.

The Amarillo plant can be considered the "mother plant" of modern helium-production methods. In addition to producing helium at much lower costs it has improved the quality of gas supplied the Army, the Navy, the Weather Bureau and other essential users. Before this plant came into operation the average purity of commercially produced helium was 95% or less. The Amarillo plant regularly is producing helium of better than 98% purity, thus giving greater lifting power per cu. ft.

In the period immediately following its completion in 1929, the Amarillo plant was not operated at capacity, but in 1942-43, the Amarillo plant facilities were expanded further as part of the bureau's $16,000,000 helium-building program, a new plant was rushed to completion at Exell, Tex., and went into production in March, 1943, another plant in the Southwest began producing in October, 1943, a fourth plant is scheduled to begin production this month, and a fifth plant is slated for production this spring.

From its plants already in production, the bureau has pushed the output of helium to many times that of prewar days and the additional plants will assist in keeping production ahead of demands.

The Future of Helium: Today the millions of cubic feet of helium flowing from bureau-operated plants are helping win the war. Tomorrow it is destined to play equally important roles in a peacetime United States.

One of the newest uses for helium is in the heliarc process for welding magnesium, the lightweight metal used in many wartime plants. The helium is used to curb the tendency of magnesium to burst into flames and it is applied to the part being welded through an especially-designed welding torch. The blanket of helium not only smothers any inclination of the metal to ignite, but it makes the joint stronger and less susceptible to corrosion. This country has almost unlimited sources of magnesium—magnesite, dolomite, brucite, raw sea water and well-brines—and if a new light metal industry springs up after the war, helium may become an integral part of it.

For more than 20 years helium has been used in experiments and in actual practice in preventing caisson disease, or "the bends," in deep-sea divers and other persons forced to work in atmospheres of relatively high pressure. Scientists designed a special decompression chamber several years ago, and oxygen-helium mixtures have been widely used by the Navy in salvage operations since that time.

Helium also is used in the treatment of asthma, tuberculosis and other respiratory diseases. In the operating room, helium is mixed with anesthetics to prevent or minimize the danger of fires and explosions.

Large quantities of helium are used in meteorological balloons as a part of the vast weather forecasting activities of the Weather Bureau and the armed forces.

Many scientists predict that the "miracle gas" is on the threshold of a greater era of usefulness and that the coming years will find it firmly entrenched as an essential element in the American way of life.

Combustion Type High Altitude Aircraft Heater

WHILE THE Aircraft heater herewith described operates on liquid fuel, it can be adapted to gas. Due to the unit's compactness and other advantages, it would be natural that interest should be shown in the heater for application to residences. Surface Combustion engineers admit that its principles offer many possibilities in that field, but feel that further research and development work is essential before such application will be practical. Such a study cannot now be undertaken because of demands for the company's entire output for installation in military aircraft. However, Surface Combustion feels that the revolutionary principles embodied in the unit will figure prominently in future heating unit developments, and will, therefore, open the way to some interesting post-war possibilities.

AMONG the many outstanding contributions of American industry to victorious prosecution of the war, few are more important than the present advanced type of high-altitude aircraft heater contributed by the heating industry of the United States under the guidance of Surface Combustion, Cleveland, Ohio.

It is a tribute to the engineering genius and manufacturing ability of the heating industry that it was able to meet so competently, in the relatively short time available, the emergency which developed in aircraft heating created by war operations carried on under every conceivable weather condition including temperatures as low as 70° F. below zero and altitudes considered unattainable before this war.

The "Surface Combustion Janitrol" aircraft heater is said to be the only combustion-type airplane heater that meets every requirement of modern high-altitude aviation. It lights and burns almost instantly at any temperature down to 70° below zero and at any altitude (over 50,000 ft. in simulated pressure chamber). It has been flight tested at 37,500 ft. It is unaffected by air densities and will operate at the high densities found at sea level and at low densities found at any altitudes. Due to its "whirl flame" principle, it is impossible to blow the heater out.

While making available many advantages heretofore not furnished by any type of aircraft heater, the "Janitrol" at the same time overcomes the drawbacks of the conventional engine exhaust heater. The most important of these have been: back pressure on engines which decreases engine power output; lack of heat supply when engines are not operating; extensive and complicated duct work in getting the heat from the source to the point of need; possibility of carbon monoxide gas entering the personnel compartments.

Operating Principles: The V-type (vaporizing) heater is designed for operation on gravity fuel feed, normally low pressures, or for operation on high pressures obtained from the fuel lines of the aircraft engines. These heaters incorporate the principle of vaporizing the fuel prior to its intermixing with the combustion air stream at which point it is ignited by a low voltage glow plug lighter. These heaters are suitable for installation on all types of airplanes with nominal heat requirements.

The following description of heater operation is keyed by numerals to the cut-away drawing, Fig. 1.

Ventilating air enters through the air ram scoop, or auxiliary motor driven blower, or combination of both, into the heater at (1), blankets the alloy combustion tube (2), is heated, and is discharged through the heated air outlet at (3) into the distribution system.

A portion of the incoming air required for combustion passes through connector (4) to the air inlet nozzle (5) and into the combustion tube. As the air enters tangentially to the inner surface of the combustion tube, a whirling action is set up in the tube which picks up the vaporized fuel and forms a fuel-air mixture (6).

Liqued fuel, at regulated pressure, is fed into a vaporizer (7) which acts as an evaporating surface. The glow plug (8) both preheats and ignites the vapor. It is automatically turned off once combustion is established. Note that the igniter coil is located outside of the high temperature range.

Tangential injection of the combustion air causes a whirling flame. It whirls the full length of the combustion tube with a travel many times the length of the tube. Two internal baffles (9) (on the 15,000 Btu. heater only) evenly distribute the heat.

As the burned gases reach the end of the combustion tube, they are expelled through an exhaust opening (10) and pass overboard at a point of zero or negative pressure on the airplane. When the combustion air pressure is in excess of that required, the spring loaded valve (11) opens to bypass the excess air into the exhaust gas outlet (10).

The "S" type (spray) "Janitrol" aircraft heater is designed for use in high or low speed and high or low altitude airplanes, where larger capacities are required. In design, it is basically the same as the 15,000 Btu. output heater, except that it is equipped with spray-type pressure burners using fuel under positive pressure, and incorporating additional heat exchanger surface.

These "S" type heaters can be equipped with either glow plug or spark plug ignition. For lower altitudes (below 20,000 ft), the spark

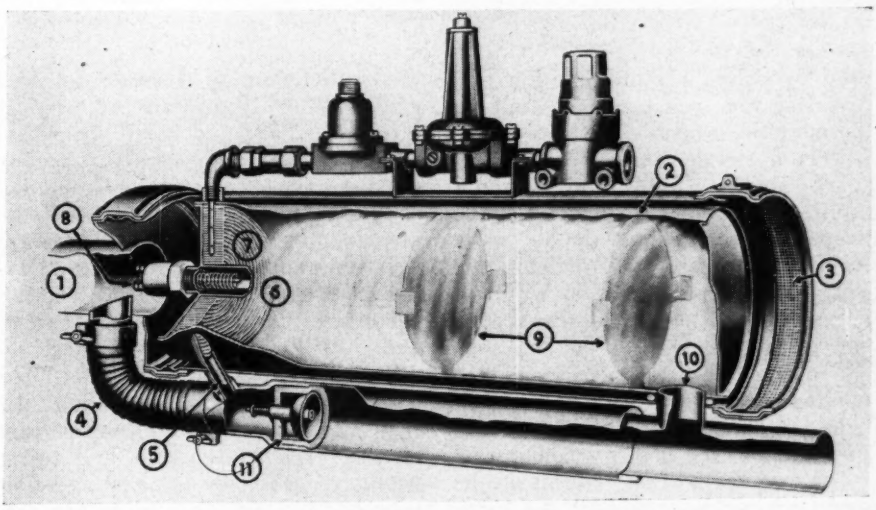
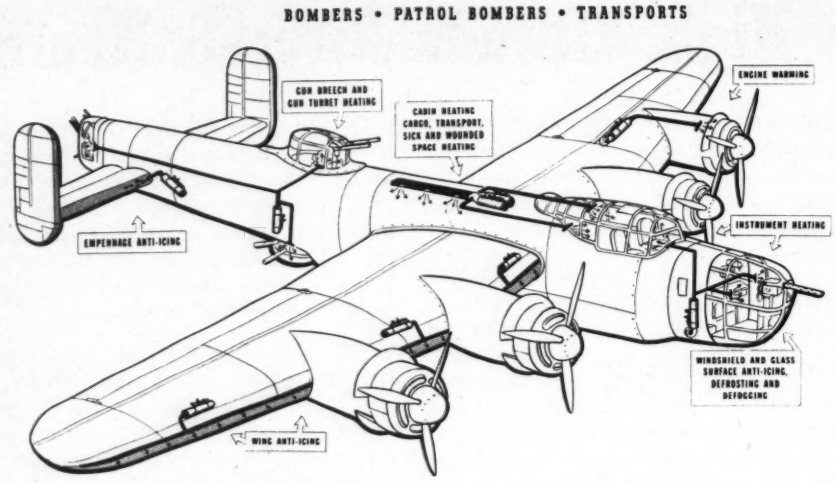


Fig. 1. Cut-away drawing of 15,000 Btu. per hour output vaporizing type "Janitrol" heater. Reference to parts indicated by numerals and to descriptive text will provide clear explanation of heater's operation.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GUN BREECH AND GUN TURRET HEATING
CABIN HEATING CARGO, TRANSPORT, SICK AND WOUNDED SPACE HEATING
ENGINE WARMING
EMPENNAGE ANTI-ICING
INSTRUMENT HEATING
WINDSHIELD AND GLASS SURFACE ANTI-ICING, DEFROSTING AND DEFOGGING
WING ANTI-ICING

Fig. 2. Drawing showing installation of Surface Combustion "Janitrol" high-altitude aircraft heater in larger planes such as bombers, patrol bombers and transports.

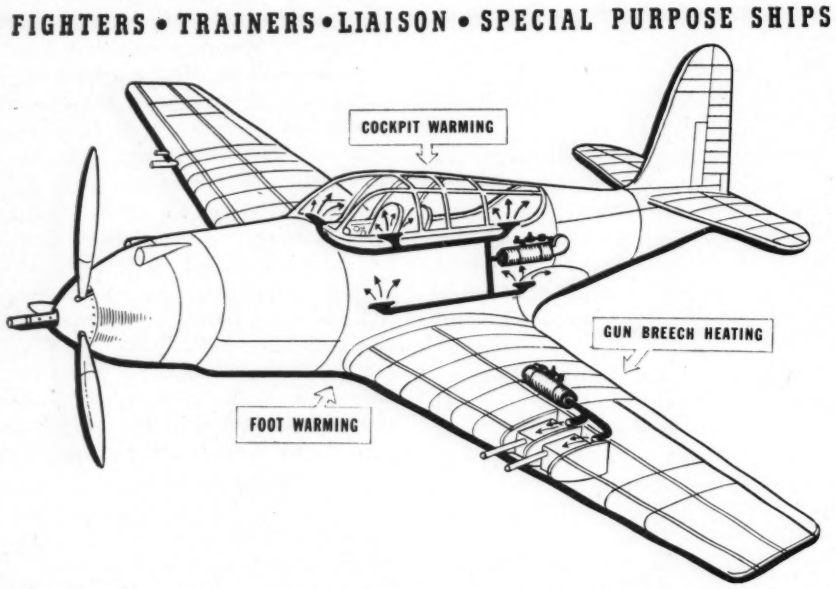


Fig. 3. Drawing showing installation of Surface Combustion "Janitrol" high-altitude aircraft heater in smaller planes such as fighters, trainers, as well as liaison and special purpose aircraft.

plug furnishes a rapid ignition system and one which lends itself to thermostatic control. The basic control is a simple hand switch. With spark ignition (which gives rapid lighting) combined with automatic temperature control, a double cycle from "off" to "on" and "off" to "on" again can be accomplished within a few seconds. The controls can be either of the "On-Off" or the "Hi-Low-Off" type. The spark coil is shielded to eliminate radio interference.

In the spark plug ignition system, preheating of the fuel is accomplished by an external heating element on the fuel feed line just ahead of the spray nozzle.

Glow plug ignited heaters of the spray type operate in the same manner as on vapor type heaters.

Application of Heater to Aircraft: The illustrations of typical large (Fig. 2), and small (Fig. 3), craft show the wide uses for heaters of these types. Heat is now needed for almost every part and area of the airplane. The applications shown are only diagrammatic and are not intended to be studied for engineering correctness. Examination of Figs. 2 and 3 will show the many heat requirements such as: (1) windshield and all glass surface anti-icing, defrosting, defogging; (2) instrument heating; (3) gun breech and turret heating; (4) cockpit heating—foot warming; (5) cabin heating for cargo transport and hospital ships; (6) engine warming on ground; (7) carburetor heating; and (8) wing and empennage anti-icing.

The "Janitrol" is now available in four sizes: 15,000, 50,000, 100,000 and 125,000 Btu. output per hour. Larger sizes are under consideration and variations in output capacity can be made on all sizes. The unit operates on liquid fuel. While high octane gasoline is most generally used, the heater with minor modifications will operate on lower octane gasolines and other liquid fuels. It can be adapted for operation on gas, this fuel having been used during early development.

Coordinated Kitchen Program Approved by AGA

AT ITS meeting of Feb. 16, 1944, the Executive Board of the American Gas Association, approved the Coordinated Gas Kitchen program, recommonded by the Post-War Planning Committee.

The program will be jointly financed by members of the American Gas Association and the Association of Gas Appliances and Equipment Manufacturers.

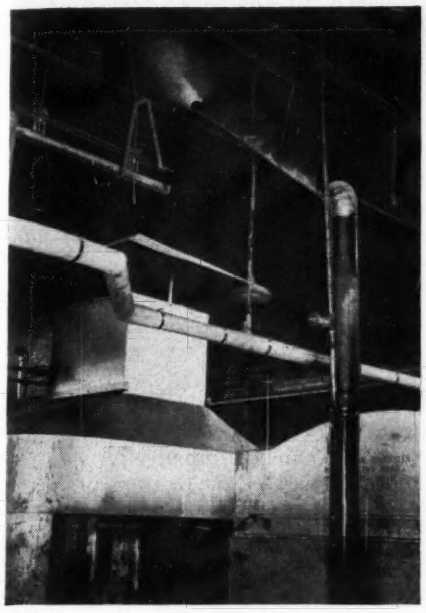
C. V. Sorenson, chairman, Residential Gas Section, will serve as coordinator of the efforts of the manufacturers and utilities in developing the Coordinated Gas Kitchen sponsored by the Association's Post-War Planning Committee. A special committee under the chairmanship of John H. Warden, vice chairman of the Residential Gas Section and sales manager of the Oklahoma Natural Gas Co. of Tulsa, Okla., has charge of the promotional aspects of the program under the guidance of Mr. Sorenson.

Members of this committtee include: Wallace M. Chamberlain, Michigan Consolidated Gas Co., Grand Rapids, Mich.; J. L. Johnson, Providence Gas Co., Providence, R. I.; J. C. Sackman, Northern Indiana Public Service Co., Hammond, Ind.; C. S. Stackpole, Consolidated Gas Electric Light & Power Co. of Baltimore, Baltimore, Md.; Bernard T. Franck, Milwaukee Gas Light Co., Milwaukee, Wis.; Frank M. Houston, Rochester Gas & Electric Corp., Rochester, N. Y.; Leon Ourusoff, Washington Gas Light Co., Washington, D. C.; Miss Jessie McQueen, American Gas Association, New York.

The committee also will include representatives of the Association of Gas Appliance and Equipment Manufacturers.

Southern Natural Rates Reduced by FPC

An order allowing reduced wholesale rates for natural gas sold in Georgia, Alabama and Mississippi by Southern Natural Gas Co., of Birmingham, Ala., to take effect April 1, has been issued by the Federal Power Commission. Estimated reductions of $192,851 a year in the cost of gas sold to Southern Natural by United Gas Pipe Line Co. become effective April 1. This reduction Southern Natural plans to pass on to its utility customers by means of supplementary schedules, which reduce rates for natural gas sold to other utilities for resale to domestic customers.



This shows a unique method of inducing draft, and driving off furnace fumes. The compressed air jet in the flue starts the fumes moving upward, and after a steady current is achieved, the air is turned off. This eliminates the need for a blower.

Compressed Air Drives off Hardening Furnace Gases

A BLAST of compressed air of less than five minutes' duration through a tall flue has solved the problem of driving off fumes from an electric furnace used to oil-harden small metal parts in one manufacturing plant, the Compressed Air Institute has revealed.

The air jet in the flue, shown in the illustration, has eliminated the necessity of a blower. After the heat has started, the oil which has remained on the metal stampings begins to bake off and produce fumes. The blast of air which has a pressure of approximately 60 lbs. per sq. in. is turned on and carries off the fumes until normal draft from the heated furnace starts.

The pipe leading to the flue, as shown in the illustration, has an elbow joint on the end, which directs the air upward. This starts the fumes moving upward, and as a steady flow is achieved, the air is turned off and the flow continues until the heat in the furnace is completed.

The outlet of the flue is situated at a cupola in the roof where the fumes are taken away by draft.

This is one of the "home-made" appliances at the Tinnerman Products, Inc., of Cleveland in which compressed air is used to solve production problems. Tinnerman manufactures self-locking speed nuts and many related products going into the production of airplanes and other war machines.

TABLE 1. Comparative Figures on Gas Utilization at Edmonton, Alberta

Year	*Population*	*No. of Customers*	*M. C. F. Sales*
1923	60,233	1,880	51,288
1928	71,249	8,948	2,271,113
1933	80,812	10,478	2,745,546
1938	90,612	11,937	3,330,284
1943	109,056	16,000*	6,584,314*

*December of 1943 estimated.

Natural Gas Usage Expands in Alberta

STEADY expansion in the role of natural gas in the life of the city of Edmonton—capital of the Canadian province of Alberta, eastern terminus of the Alaska Highway, and second "home" for thousands of American soldiers—is disclosed in a recent report by E. F. McGarvey, assistant to the general manager, of Northwestern Utilities, Ltd.

According to Mr. McGarvey, annual revenue in 1943 from new domestic, commercial and industrial loads was boosted by approximately $300,000. At least one-fifth of this amount resulted from installations requested by the United States Northwest Service Command—such as at the American airport, the U. S. Hospital Base, and the U. S. Engineering Department.

In addition to detailing activities throughout the past year, Mr. McGarvey's report also sketches the progress made by the company since it "turned on" its first gas consumer slightly more than 20 years ago—on Nov. 1, 1923, to be exact. Comparative figures revealing acceptance of gas in the area are shown in the table.

The company's first office was opened June, 1923, and a large sales staff set to work to secure service applications. Because appliance dealers in the city were indifferent to the future prospects of gas, or skeptical as to the possibilities, the company was forced to take on the full responsibility of supplying appliances.

Among highlights of 1943 activities, Mr. McGarvey notes that five new wells were drilled in the Kinsella field with a total open flow of 71 Mcf. per day. These five wells, and one drilled late in 1942, were connected to the field gathering line, giving a total connected open flow in the Kinsella field of nearly 258½ Mcf. per day. Combined connected open flow of the Viking and Kinsella fields now is close to 363½ Mcf. per day.

New Radio Time Bought By Cincinnati Group

Cincinnati Group Companies (Cincinnati Gas & Electric Co.) are now broadcasting on WKRC, Monday to Friday, a new 15-minute program "At Your Service," from 11:15 to 11:30 a. m. The new program, aimed primarily at a feminine audience, features household hints, general information, and a broad handling of news. In addition, the same companies sponsor the broadcast of weather reports three times daily, except Sunday. Their commercial announcements are varied, and now concern themselves almost entirely with gas and other fuel conservation messages.

Canadian Gas Production

Natural gas produced in Canada during November, 1943, totaled 4,154,053,000 cu. ft. compared to November, 1942, output of 4,642,666,000 cu. ft. and 3,401,401,000 cu. ft. in October, 1943, according to the latest report from the Dominion Bureau of Statistics in Ottawa. Total for the first 11 months of 1943 was 39,147,687,000 cu. ft. against 40,319,035,000 cu. ft. in the same period of the previous year. These figures do not include Alberta Turner Valley gas used for repressuring or waste gas burned in the field.

Wisconsin Men Deferred

The Wisconsin Public Service Corp. has reported that the State Selective Service Board has issued blanket deferment for all of that company's pre-Pearl Harbor fathers between the ages of 18 and 38. Replacement schedules were to be filed with the state board by Feb. 1, indicating the period necessary to train replacements for each individual in this group, in order to permit the orderly withdrawal of men from essential industry.

Sour Gas Production Cut

The Railroad Commission of Texas has set allowable production of sour natural gas from wells in the West Panhandle field at 710,363,000 cu. ft. for February. According to the order, the commission found that the combined producing capacity of wells in that area is in excess of reasonable demand, and that the restriction was necessary to prevent or minimize drainage of gas between tracts segregated as to surface position and common ownership.

Post-war NOTES and NOTIONS

By STANLEY JENKS

Dealer Allies

If I were a utility sales executive at this time, I would be inclined to take very seriously indeed the attitude of furniture dealers toward utility merchandising as developed by the recent survey, "When Appliances Come Back," made by the Post-War Planning Committee of the National Retail Furniture Association. (G A S, February, 1944, p. 13.)

The dealers, according to the survey, show an encouraging willingness to see the other fellows' viewpoint (that is, ours). May ours be equally understanding of theirs when the time comes, as it will, to sit down around the table and work out a mutually profitable cooperative gas appliance selling program.

There are three points of main concern to the furniture dealer, and on which he asks a revision in our basic sales policies.

Salesman's Compensation

The furniture dealer thinks a domestic appliance salesman for the gas company should be paid according to his load-building ability, rather than for his ability to sell gas appliances, which might be sold cooperatively by the dealer. In other words, it is suggested we quit competing with our logical load-building allies. Right! Some of our past utility merchandising policies have literally been as absurd as the oil companies' going into the automobile business in order to sell gasoline. Any dealer handling a high quality gas range deserves encouragement and not the intensive competition of commission-hungry gas utility salesmen. On appliances having customer acceptance, such as gas ranges in particular, the utility policy should be that it will only sell when, where, and if the dealer can't or won't. And the utility salesman's compensation should be the same whether he or the dealer sells it, the compensation in turn being governed by the load-building value of the appliance as discussed on this page last month. The policy of wanting both the merchandise profit (sic) and the added revenue is childishly greedy, for it fails to consider the indigestible consequences of "sorehead" dealers, the intensified competition it promotes from other fuels, and the corrupting temptation in our own selves to merchandise, rather than load-build.

Pricing Appliances

The furniture dealers ask the utilities to maintain "a standard set" of prices. I must confess I am not sure I know what they mean; but if they mean, as I think they do, that gas utilities should establish retail prices on their merchandise which on comparable merchandise on the dealer's floor permit the dealer to make a fair profit, then the point is very well taken. The furniture dealer is really saying that he has to make a profit on his merchandise to stay in business, and he resents being kicked around by uneconomic price competition from a utility, which gets its main profit from the fuel service it renders and considers merchandising profit, if any, just so much additional gravy. Live and let live, at least.

Cooperative Advertising

There needs to be a considerable revision of ideas on this subject. From personal experience, I know the average dealer to be extremely individualistic. He gets little satisfaction from seeing his name grouped with those of his dealer competitors and stuck at the bottom of a general newspaper advertisement "Sponsored by the Gas Company." Of course, he takes it, and while he might smile in doing so, I know in his heart he'd much rather be taking a bite at the hand that is feeding (?) him. A lot of good utility money has been ineffectively spent this way.

Why can't the utility make a deal with every cooperating dealer, whereby the utility's share of his newspaper advertising is proportional to (1) the dealer's volume of sales, (2) the rated load-building value of the appliances sold by the dealer, or (3) on a basis of paying a definite percentage of the dealer's gas appliance advertising up to a certain annual maximum?

I favor the last method because it lends itself to ready budgeting and at the same time gives the utility a proper control over the quality of gas appliances handled by the dealer and over the copy too. I know the dealer will prefer any cooperative advertising program which permits him the individualism of an advertisement in which only his name appears.

In the light of what many utilities are in the habit of spending for so-called "good will" advertising, which is sometimes a testimonal to the vanity of a front office stuffed shirt, or more generally an innocuous expression of the orchidaceously obvious, the net added cost, if the money were more advantageously spent in directly helping dealers sell gas appliances, would be surprisingly low.

The Dealer's Part

Besides being mutually profitable, any cooperative plan must be *mutually* satisfactory. Each party acquires new responsibilities, the acceptance of which must be obligatory if the plan is to succeed. Most of our previous alleged dealer cooperative plans failed because they were basically insincere, in that they were designed to go through the motions of appeasing (or bribing) a dealer group or to take the edge off a competitive situation, which, nevertheless, still existed, because we can't compete and cooperate at the same time.

The dealer must agree to meet the utility half way. He must show and continue to show evidence that he can sell gas appliances in satisfactory volume. He must handle acceptable quality lines, and be prepared to shoulder his full share of post-sale servicing responsibility.

In a nutshell, the utility is load-minded; the dealer is profit-minded. There is, therefore, a fundamental basis present, upon which a mutually beneficial relationship can be built. The trouble in the past has been our unreasonable insistence that the dealer be both load- and profit-minded.

CORROSION AND PROTECTION

Of Buried Metallic Structures

Compiled and Abstracted by GUY CORFIELD, Technical Editor, GAS

1. Electrical Potential Phenomena (Cont'd)

The Values of the Theory of the Potential

CHARLES KASPER, chemist, National Bureau of Standards, Washington, D. C. Excerpts from a paper, "The Values of the Theory of the Potential to the Corrosion Engineer," presented before the Fifth Soil Corrosion Conference, National Bureau of Standards, St. Louis, Mo., March, 1943.

FOR the most part, the literature on corrosion represents factual observations on corroding systems in the field and under simulated conditions in the laboratory. A large portion of this literature, in particular the entire phase of underground corrosion, is concerned with reporting types of corrosion that are definitely electrochemical in nature. A literature which primarily deals with observations is the initial phase of any scientific activity, and in the case of any applied science, like the one under consideration, the next step is to resolve the multitude of observed facts in terms of scientific developments that are regarded as more basic—a step which is necessary in order that the subject may not become unwieldy due to the bulk of recorded relevant facts.

To this end there have been numerous analyses of field data and of specifically designed laboratory experiments employing the principles of electrochemistry, and direct consideration of corrosion in terms of the ultimate bases, chemical thermodynamics and reaction kinetics, is beginning to assert itself. However, in the transliteration of the relevant phases of electrochemistry to form the basis of the scientific consideration of electrochemical corrosion, extreme care must be exercised against the incorporation of major faults in the literature of electrochemistry.

A major fault in that literature has been that the principles of electricity are not always given their correct expression. The reasons underlying this fault are not difficult to find. Research in electrochemistry has been designed to yield knowledge on chemistry, and the electrical problems associated with complex geometrical situations (that obtain in almost all practical application) have been divorced from the strictly chemical ones by the expedient of selecting geometrical systems of sufficient simplicity. The research has been intended in part to present facts which would enable the electrician to state what changes can be expected due to alterations in geometry from that under which the properties of the electrode reaction (equilibrium reaction potential, and polarization) were determined. The conductivity of the medium is also involved. It was expected that the electrochemist would avail himself of the necessary phases of electricity when questions involving electrical flow under varied geometrical conditions arose, and practical application resolves itself very frequently into just such questions.

In the literature of electrochemistry there are a great many publications which presuppose that no provision exists in electricity proper to handle problems encountered in applied electrochemistry. The problem types encountered in applied electrochemistry can and do represent comparatively high planes in reasoning on electricity. Any treatment approaching what may be called "satisfying completeness" would involve the entire realm of the development of theoretical electricity as applied to flow and in the end would lead to problem types for which modern research in mathematics is only now attempting to find methods of solution.

The author is not proposing that the corrosion engineer be a mathematician. After all, the subject of corrosion engineering involves knowledge which can be gained only by first-hand experience, and it is not expected that simple computations can replace that experience. However, as in many other subjects, mathematics can be used to certify at least some of the ideas upon which the corrosion engineer invests considerable time and effort. Mathematics also can be used to suggest ideas that may be of practical significance. It does not follow *ipso facto* that all phases of any applied subject can be so treated, but when electrical flow is involved considerable advance may be possible through such a consideration.

The statement of the methods under which a mathematician can extend experience of experimental fact in electricity and many other subjects, and the limitation of those methods is known as the theory of the potential.

The object of this paper is to call attention to some developments of the theory of the potential which may be of value to the corrosion engineer[1]. Three items will be discussed and in reverse order these are: (3) some possible models of interest in field investigations, (2) some possible models of interest in laboratory studies of corrosion, and (1) the so-called Kirchhoff laws of electricity.

The usual mathematical training of the engineer (two or three years of college mathematics) is sufficient for him to obtain considerable information on the subject, and even a "rusty" knowledge is sufficient background to follow discussion of fact particularly when one has considerable experimental knowledge of the relevant phases.

The So-Called Kirchhoff's Laws of Electricity: In the literature of applied electrochemistry, and here we shall include electrochemical corrosion, there are publications in which

[1]A discourse on the importance of the theory of the potential to the technical practice of electrodeposition by the author can be found in the *Transactions* of the Electrochemical Society. Charles Kasper, The Theory of the Potential and the Technical Practice of Electrodeposition, I, *77*, 353, 1940; II, *77*, 365, 1940; III, 1940; IV, *78*, 147, 1940; V, *84*, preprint 4, 1942.

"Kirchhoff's law" of electricity is applied to derive relationships that are considered to be important. Hence an analysis of what can be obtained by such an approach is pertinent. In the subject of electricity proper, the name of Kirchhoff is associated particularly with two important steps, and each represents essential knowledge to the electrochemist. Kirchhoff is considered by the experimentalists to be the first definitely to assert that the theory of the potential (applied successively to gravitation, electrostatics, magnetostatics, and heat flow) can be employed to describe electrical flow. He pointed out that the conditions required in order to apply to electrical flow the usual type of problem of the theory of the potential as applied to electrostatics was that the medium be homogeneous and obey a linear law of conduction, Ohm's law. Since then researches of that kind on various conductors, including soils, have been done over and over again so that in the modern literature of physics there is no question of applicability. In fact the experimental method is used as a tool to deal with cases of practical importance that cannot be or are not computed[2].

The second step referred to is Kirchhoff's theory of networks, designed for handling problems involving separate resistors, under the condition that the characteristic of each and every resistor can be determined separately (experimentally, if necessary) and the only problem remaining is the determination of what particular combinations of them will do. Kirchhoff's theory of networks is the expression that the laws of electricity take for those particular kinds of problems.

Under the condition that there is a constant drop of potential at the interface of the electrodes, it is possible to include electromotive forces in the arguments. The primary object of this development of Kirchhoff was to handle "circuits" of the kind occurring in the electrical laboratory, in instruments, and in such commercial installations as approximate such circuits, involving separate resistors. Electromotive forces were included to extend the possible cases that can be handled to include batteries, an all important source of electric power in these days. The point to be emphasized from the mathematical point of view is that whether or not Kirchhoff's theory can be applied can be known beforehand from the measurement of each separate resistor.

We have employed the theory of the potential to define a range of conditions under which calculations according to the network theory, a very special development of the theory of the potential, can be used to describe experimental results when the experiments are made in accordance with the restrictions set forth. Conceding agreement, the next question is, of what utility are they? If the object is to measure constant (polarization) of the electrode reactions, or the specific conductivity of the solution, then those constants may possibly be determined more readily in another arrangement in which it is clearly evident that that is the *sole* purpose of the experiment. If the object of the experiment is to illustrate a process such as corrosion due to anodic and cathodic areas, then the extent to which it is possible to translate the results of any experiment based on network theory to the actual practical case of interest is the extent of success of the experiment.

It is to be emphasized that this translation must not exceed the limitations placed on the use of the theory of networks by the theory of the potential. There are situations under which application of the theory of networks becomes meaningless and this involves the very core—the definition of resistance. If such a treatment enters into the construction of a theory of corrosion, then it will be profitable to examine the electrical problems involved from the standpoint of the basic theory rather than employing some special form applied to special types of systems. If the treatment is employed in an engineering application, then it may be profitable to examine the subject in terms of the basic models which it may be possible to construct.

Some Possible Models of Interest in Laboratory Studies of Corrosion: The real problem in corrosion theory is the construction of models which will furnish the rationale to the understanding of phenomena like pit corrosion, and its persistence. It is to be emphasized that the theory of the potential enters only in providing the possible methods of handling the electrical problems involved. The real basis must come from some other source—the theory of surface reactions, and particularly the reason for the induction over the surface of "anodic" and "cathodic" reactions. However, such an ambitious undertaking can meet with success only after considerable work has been done on simpler cases, and this is where models for laboratory study come in. In part they will furnish information about corrosion processes, and in part they will illustrate the type of reasoning which must be employed in order to handle the problems in electrical flow that are involved.

The best way to obtain constants of electrode reactions is to construct models such that the current density is uniform over the electrode surfaces and measure the potential drop at the electrode surfaces with variable current density. This method is quite cumbersome, but under some conditions, like dealing with soils, it appears to be the only method which has been proved to be correct. However, when the medium in which the current of the electrochemical reaction flows is a liquid, the horizon is considerably brightened

[2]For recent articles see, for example, E. G. Ramberg and G. A. Morton, J. Applied Phys. *10*, 465 (1939); F. Morgan, M. Muskat and D. W. Reed, ibid., *11*, 141 (1940); S. Bertram, ibid. *13*, 496 (1942).

GAS presents the third in a series of articles on the protection of buried metallic structures, a subject of vital importance in the war-time days of material shortages. The series will cover the following general ramifications of the protection problem: (1) Electrical Potential Phenomena; (2) Corrosion Coupons; (3) Pipe Coatings; (4) Cathodic Protection, Theory and Research; (5) Cathodic Protection, Influence on Adjacent Structures; (6) Cathodic Protection, Application; (7) Miscellaneous—Soil Surveys, Special Problems, Anaerobic Corrosion. The first section of the first topic, Electrical Potential Phenomena, appeared in the January issue of GAS, p. 29.

In compiling and editing the series, GUY CORFIELD, technical editor of GAS, has used as source material more than 40 papers which were presented during the past 18 months before the meetings of the Fifth Bureau of Standards Soil Corrosion Conference, the American Gas Association, the Pacific Coast Gas Association, the American Petroleum Institute, and the Petroleum Industry Electrical Association.

Guy Corfield

GUY CORFIELD graduated in 1924 from the University of British Columbia with the degree of Bachelor of Applied Science in Chemical Engineering. For the past eight years he has been research engineer for the Southern California Gas Co., Los Angeles. In this capacity he has recently been in charge of the technical aspects of the installation of the company's butadiene project. Long active in the technical affairs of the gas industry, Mr. Corfield has served on numerous committees of the Pacific Coast Gas Association, being chairman in 1933 of the Association's Technical Section. His work with the American Gas Association has been continuous. This year he is serving on that Association's Chemical Committee, Gas Conditioning Committee, and on the Technical Advisory Committee for Domestic Gas Research Project No. 1—Domestic Gas Cooking. His connection with the AGA subcommittee on Pipe Coatings and Corrosion makes him a logical editor for this compilation of studies on the subject of corrosion.

through the use of some models which are immediately suggested by the theory. It is to be particularly emphasized that the selection of any particular one is solely a matter of personal preference unless the geometrical form involved is one of practical importance.

The simplest type of problem of the theory that may have an application in the study of corrosion is that in which the surface of the electrode is not at a uniform potential, the conducting medium at all times being assumed to be homogeneous and obeying a linear law of conduction, Ohm's law. It is not commonly known among electrochemists that some of these problems are amazingly simple. We can mention offhand several possible models of suitable type, but we shall restrict our detailed consideration to one.

Consider a rectangular parallelopiped as defining the boundaries of our conducting medium, say a sodium chloride solution so frequently used in corrosion studies. All sides except when specifically stated otherwise are insulators, and it is well to point out that the top of the solution is also such an insulator. Initially one vertical side is a conductor composed of two sections (line of demarcation vertical), one at one potential, one at another. These may be a strip of zinc and a strip of copper. If the specific conductivity of the medium and the uniform potentials are given, then everything that we wish to know can be computed if the potential remain uniform and the other requirements are not violated. In the actual case the potential over the sections will not remain uniform and the experimentalist would content himself with determining the deviation.

The experiment, however, has more latent possibilities than that. Having the potential over the surface uniform over certain sections of the surface is, of course, highly arbitrary. If the experimentalist will at any time determine the potential distribution (in the horizontal direction) over the surface in question, then the mathematician can in the particular system under consideration calculate any quantity that he wishes, provided the other restrictions are not violated and it is simply a study in electrical flow.

Some Possible Models of Interest in Field of Investigations: In dealing with buried structures it is a common practice to prevent corrosion through the use of bituminous coatings. However, in time such coatings may crack and local couples will be set up. Under such a condition the corrosion engineer will resort to polarizing cathodically the exposed surface in order to minimize the corrosion. There are three distinct phases of the problem: (1) to locate the faults and their extent before excessive damage has been done, (2) to determine the current density necessary to prevent corrosion, and (3) to achieve the desired current density with the installation of the minimum of auxiliary equipment. Under problem (1) the only methods that appear possible are those based on electrical measurement, and in due time models must be developed which can show whether or not practicable measurements can be made to ascertain the extent of the exposed surface. Problem (2) clearly must depend on experimental knowledge. Under problem (3), however, it can be readily shown that some of the existing models of the theory do have an application, and there is definite promise that others of importance can be developed. It is the object of this section of the paper to consider some possibilities under (3).

The first model of importance is the two-dimensional problem of the interaction of an infinitely long line electrode (of uniform current strength per unit length) parallel to an infinite insulating plane. (In two dimensions the line electrode will appear as a point and the insulating plane as a line, a cross section of the case in the language employed.) The conducting medium is the entire infinite region bounded by the insulating plane, and the flow is to a great semi-circular cylinder at infinity. The conducting medium is homogeneous.

The potential distribution in the vicinity of the line electrode (vicinity referring to distances of the order of that of the line electrode from the insulating plane) will approximate that of a pipe buried "sufficiently deep" with flow from "distant" sources, the surface of the earth simulating the insulating plane. The meaning of "sufficiently deep" and "distant" can be defined from other models. If the requirements of the calculation are satisfied, and if one has knowledge of potential over the surface of the earth at measured points from the pipe and the specific conductivity of the earth, one can calculate the flow to the pipe per unit length. This idea as applied to this model and others that can be developed may be important to pipeline engineers in checking uniformity of current distribution over the pipe in the axial direction because, for a limited zone of observation, the flow will be two-dimensional.

"The tank farm problem" is another example where existing models may be of value. From an electrical point of view, the bottom of a circular tank resting on the surface of the earth simulates the circular desk problem which is known. From the freely electrified case one can section out the problem of a circular disk on an infinite insulating plane with the flow to a great semi-sphere at infinity. Also the problem is known where the flow is to a point sink, which may be anywhere and in particular in the insulating plane. From this problem one can study the influence of the position of the sink on the current distribution over the disk. In fact, through superposition one can have a number of such sinks. The form in the current distribution is of interest to corrosion engineers in that the edge effect must be taken into account in computing the total current which must be applied in order that the spot of minimum current density will have a sufficient current density to protect that spot cathodically. In the isolated case the current density is inversely proportional to the square root of unity minus the square of the ratio of the position of the point from the center to the radius of the disk. By simple integration one can readily obtain the fraction of the current which proceeds to the various zones.

It is to be emphasized that these are models which are evident from the present development, and there is no question but that intensive study will bring to the corrosion engineer many more of the values of the theory of the potential.

(Corrosion coupons will be discussed in G A S for April)

Gas Vitamins

Synthetic vitamins, extracted by British chemists from coal in the process of gas making, are playing an important part in maintaining the nation's war-time health. These vitamins are B1—carbohydrates or thiamine hydrochloride—and K or menadione. The former gives protection against diseases due to gross deficiency, while the latter is a chemical substance which promotes coagulation of the blood.

Coal is burned under boilers to produce mechanical energy; carbohydrates are burned in the body to produce vital energy. It is significant that the first vitamin to be made synthetically from coal is one associated with carbohydrates. Vitamins are essential for the well-being and proper functioning of the body. Many of these are obtained from food and also in the action of the sun's rays on the skin. But where these are not obtainable owing to war-time stringency, they can be introduced synthetically into manufactured foods.—"The Gas World," Oct. 9, 1943.

ASSOCIATIONS

AGA and PCGA Sponsor West Coast

Domestic Gas Research Conference

The West Coast Technical Conference on Domestic Gas Research, under the joint sponsorship of the Committee on Domestic Gas Research of AGA, Everett J. Boothby, Washington, D. C., chairman; Postwar Appliance Committee of PCGA, W. M. Jacobs, Los Angeles, chairman: and Manufacturers Section PCGA, H. A. Sutton, chairman, will be held at the Ambassador Hotel, Los Angeles, on March 15.

In general the conference will follow the lines of the Research Conference held in Cleveland on Feb. 17 and 18, with papers by members of the Cleveland and Los Angeles Laboratories' research staffs, by members of the Technical Advisory Subcommittees for the several projects, and by prominent officials of gas companies and appliance manufacturing companies; with technical discussions on all papers; and with demonstrations of research both at the hotel and at the Pacific Coast Branch of the Laboratories.

Papers to be presented include:

Why the new features of gas appliances must be developed now—Harry L. Masser, chairman, Committee for Gas Industry Development, PCGA.

The technique of advancing atmospheric gas burner design—Mixing tubes, burner ports and flame characteristics—F. A. Allen, assistant supervisor, Pacific Coast Branch, AGA Laboratories.

The technique of advancing atmospheric gas burner design—Optimum volume and noise of extinction characteristics—A. A. Jaquot, engineer, Pacific Coast Branch, AGA Laboratories.

Noise and heat transfer factors in the design of gas heating appliances—W. R. Teller, chief research engineer, AGA Laboratories.

The relationship of fundamental research to gas appliance development—F. M. Banks, vice-chairman, Committee on Domestic Gas Research, AGA.

Practical phases of fundamental gas cooking research—top sections—R. M. Conner, director, AGA Laboratories.

Practical phases of fundamental gas cooking research—ovens and broilers—F. A. Allen, assistant supervisor, Pacific Coast Branch, AGA Laboratories.

Fundamental gas water heating research—efficiency aspects.

Design and performance features of post-war gas burners—aerated flames—W. R. Teller, AGA Laboratories.

Design and performance features of post-war gas burners—non-aerated flames—(Speaker to be announced).

Fundamental gas water heating research—combustion aspects—W. H. Vogan, supervisor Pacific Coast Branch, AGA Laboratories.

The Thursday afternoon panel session will be on the following subjects:

Translating and applying fundamental research data for better gas cooking appliances—conducted by Guy Corfield, member of Technical Advisory Subcommittee for Gas Cooking Research.

Translating and applying fundamental research data for better gas water heating appliances—Conducted by H. W. Geyer, member of Technical Advisory Subcommittee for Gas Water Heating Research.

Translating and applying fundamental research data for better central gas space heating equipment—conducted by E. L. Payne and Ray Logue, members of Technical Advisory Subcommittee for Central Gas Space Heating Research.

John J. Quinn, general sales manager, Boston Consolidated Gas Co., presided at the opening session of the Cleveland conference. Technical papers covering the technique of advancing atmospheric gas burner design and noise and heat transfer factors in the design of gas heating apliances were presented by F. E. Vandaveer, K. H. Flint and W. R. Teller of the AGA Laboratories.

At the luncheon meeting on Feb. 17 Frank H. Adams, general manager, Surface Combustion, Toledo, spoke on the relationship of fundamental research to gas appliance development. Mr. Adams also occupied the chair at the afternoon session which considered practical phases of fundamental gas cooking and gas water heating research as presented by F. E. Vandaveer and K. R. Knapp of the AGA Laboratories and W. R. Fraser, a member of the Technical Advisory Subcommittee for Gas Water Heating Research.

H. W. Geyer, utilization engineer of the Southern Counties Gas Co., Los Angeles, and a member of the Technical Advisory Subcommittee for Gas Water Heating Research, presided at the second day's morning session at which additional papers covering design and performance features of post-war gas burners and fundamental gas water heating research were presented by Leon Ourusoff, member of the Technical Advisory Subcommittee for Gas Cooking Research, and W. R. Teller and F. R. Wright of the AGA Testing Laboratories. Speakers at the luncheon the same day were: Lyle C. Harvey, vice president, Association of Gas Appliance & Equipment Manufacturers, and R. M. Conner, director of the AGA Laboratories.

Following the luncheon three panel sessions were conducted by the three Technical Advisory Subcommittees on gas cooking, gas water heating and central gas space heating. Problems involved in translating and applying fundamental research data to help in producing better gas appliances were discussed.

New England Meeting

BECAUSE of war requirements, the New England Gas Association annual meeting is this year being confined to a one-day conference rather than the usual two-day program. This curtailment has meant the omission of papers of rather direct interest to members of the several divisions, the appliance and equipment exhibit, the home service luncheon, and certain other special functions that have customarily been included in the annual meeting. The Program Committee, however, has developed a strong program of direct interest to company executives, including department heads and their principal associates. Edwin L. Hall, Manchester Gas Co., is chairman of the Program Committee.

The conference this year is being held at the Hotel Statler, Boston, on March 23. The morning program, following the election of officers and directors and the annual report of the executive secretary, will be devoted chiefly to post-war matters, with addresses by Colonel Willard F. Rockwell, president, AGAEM, and president, Pittsburgh Equitable Meter Co.; N. B. Bertolette, president, NEGA, and president, the Hartford Gas Co.; Ernest R. Acker, president, AGA, and president and general manager, Central Hudson Gas & Electric Corp.; A. M. Beebee, chairman, AGA Post-War Planning Committee, and general superintendent, gas department, Rochester Gas & Electric Corp.: and Dean Walter R. MacCornack, Department of Architecture, Massachusetts Institute of Technology.

The program for the afternoon session includes the following addresses:

Gas Industry Research—Everett J. Boothby, chairman, AGA Committee on Domestic Gas Research, and vice president and general manager, Washington Gas Light Co.

Like a friend from Home..your

RED CROSS
is at his side!

YOUR American Red Cross hut may be a grass shack "down under" . . . a dugout in desert sand or a tin roof sod house in the Arctic. But inside it's Home . . . comforting and warm . . . right at his side on 53 foreign fields of this war.

Your dollars working through the Red Cross War Fund become a voice from home to cheer him when homesick, to ease his worries, to give him comfort at any time any place, even if he were taken prisoner. If he were wounded to give him blood and surgical dressings to bind his wounds.

The Red Cross War Fund quota in '44 is unprecedented in size to meet unprecedented needs. Be generous in your giving in this year of war.

PACIFIC GAS AND ELECTRIC COMPANY

A Few Facts About the Institute's Program—John I. Yellott, director, Institute of Gas Technology.

The Importance of the Gas House Heating Load—Henry O. Loebell, chairman, AGA Subcommittee on Economics of House Heating, and consultant, Surface Combustion Division, General Properties Co., Inc.

Industrial Gas Outlook—Frederic O. Hess, president, the Selas Co., Philadelphia.

We'll Always Need Gas—C. George Segler, engineer of utilization, AGA.

Southern War Conference

THE tentative program for the War Conference of the Southern Gas Association, to be held in New Orleans on March 22 and 23, includes three general sessions, and divisional meetings of the Sales, Operating, Industrial and Commercial, Accounting and Home Service Sections.

The presidential address, "Gas—Its War Task and Post-War Responsibility," by Frank Smith, president, Houston Natural Gas Corp., will set up the theme of the convention. Other topics and speakers in the general sessions will probably include: post-war employment, by A. B. Paterson, president, New Orleans Public Service Co.; employee conditioning, J. D. Flanagan, United Gas Pipe Line Co., Houston, Texas; gas air conditioning, Joe H. Gill, president, United Gas Corp., Miami, Fla.; tomorrow's appliances, Dean Strickland, sales manager, United Gas Corp., Houston, Texas; servicing, J. H. Collins, New Orleans Public Service Co.; home service, Arthur P. Hirose, director of market research and promotion, McCall Corporation, New York City; advertising, H. Carl Wolf, Atlanta Gas Light Co.; and the future of gas, Louis P. Ruthenburg, president, Servel, Inc., Evansville, Ind.

Subjects of discussion and discussion leaders for the section meetings are tentatively listed:

Sales

Appliance Financing Trends—L. M. Lilly, First Bancredit Corporation.

Sales Personnel, Selection and Training—Seward Abbott, Servel, Inc.

Panel discussion, post-war markets—W. A. Hudson, Chattanooga Gas Co.; J. W. Lea, Atlanta Gas Light Co.; Lee Woodward, Zenith Gas System, Inc.

Metropolitan Markets—C. K. Patton, Dallas Gas Co.

Operating

Distribution System Design—E. L. Henderson, United Gas Corp.

Underground Construction—W. C. Voight, Birmingham Gas Co.

Distribution System Maintenance—R. A. Puryear, Jr., Alabama Gas Co.

Field Testing of Meters—B. F. Worley, United Gas Corp.

Tomorrow's Gas Meters—Norton McKean, American Meter Co.

Installation of Residential Meters—W. H. Ligon, Atlanta Gas Light Co.

Pressure Control—H. M. Blain, Jr., New Orleans Public Service Co.

Industrial and Commercial

E. Maurice Myers, Natural Gas Division, OWU.

Industrial Equipment—F. J. Evans, F. J. Evans Engineering Co.

Natural Gas as a Chemical Raw Material—James E. Pew, Petroleum Administrator for War; Frank H. Dotterweich, Texas College of Arts and Industries.

Commercial Gas Cooking—E. J. Shermire, Detroit Michigan Stove Co.

Gas Refrigeration—W. R. Hainsworth, Servel, Inc.

New Industrial Applications—Infra-red Rays in Textile Industry; Dehydration of Live Stock Feed—Bruce Varney, Cerophyl Laboratories, Inc.

Accounting

Personnel Problems.
Selection and Training of Personnel.
Office Procedure Manuals.
Reserve Allowances.
Wage and Salary Stabilization.
Commercial Office Procedure.
Utility Cost Accounting.

Home Service

Round Table Discussion.

Calendar

March

Oklahoma Utilities Association—March 14.

AGA West Coast Technical Conference on Domestic Gas Research—Ambassador Hotel, Los Angeles, Calif., March 15-16.

Southern Gas Association Convention—Roosevelt Hotel, New Orleans, La., March 22-23.

NEGA Annual Meeting—Hotel Statler, Boston, Mass., March 23.

AGA War Conference on Industrial and Commercial Gas—Hotel Seneca, Rochester, N. Y., March 30-31.

April

Interstate Oil Compact Commission Spring Meeting—New Orleans, La., April 3-4.

Mid-West Gas Association—Fort Des Moines Hotel, Des Moines, Iowa, April 5.

National Association of Corrosion Engineers—Rice Hotel, Houston, Texas, April 10-11-12.

Midwest Power Conference, arranged by Illinois Institute of Technology—Palmer House, Chicago, Ill., April 13-14.

Natural Gasoline Association of America—Baker Hotel, Dallas, Texas, April 13-15.

AGA Distribution Conference—Hotel Statler, Cleveland, Ohio., April 18-19.

Missouri Association of Public Utilities—Jefferson Hotel, St. Louis, Mo., April 19-20.

May

Pennsylvania Gas Association Annual Meeting—Philadelphia, Pa., May 2.

17th National Oil and Gas Power Conference, Oil and Gas Power Division, American Society of Mechanical Engineers—Tulsa, Okla., May 8-10.

AGA Natural Gas Department Spring Meeting—French Lick Springs Hotel, French Lick Springs, Ind., May 11-12-13.

Indiana Gas Association, 1944 Convention—Hotel Lincoln, Indianapolis, Ind., May 15-16.

American Petroleum Institute—Tulsa, Okla.

June

Southwestern Gas Measurement Short Course—University of Oklahoma, June 6-7-8.

AGA Joint Production and Chemical Committee Conference—Hotel Pennsylvania, New York, N. Y., June 6-7.

Public Utilities Advertising Association—Palmer House, Chicago, Ill., June 6-8.

November

American Petroleum Institute—Stevens Hotel, Chicago, Ill., Nov. 13-16.

PCGA Technical Meeting

THE Technical Section of the Pacific Coast Gas Association under Chairman Elting Henderson, distribution superintendent for Southern California Gas Co. held a two day discussion of production, manufacture, compression, measurement, and regulation problems on Feb. 16 and 17 in Fresno, Calif.

Sponsor of the meeting was O. L. Dickinson, manager, San Joaquin division of Pacific Gas and Electric Co., who opened the first day's sessions which emphasized problems of production, manufacture and compression. Under the general topic of gas conservation K. B. Anderson of Coast Counties Gas & Electric Co. discussed an accumulation of experience in solving a number of problems which arose from the operation of isolated butane systems and butane standby.

Guy Corfield reviewed the Southern California Gas Co.'s experience in butadiene manufacture (GAS, July and November, 1943) and described the recently installed flotation cells and pre-coat Oliver filter units recently installed at the butadiene plant (See Page 54).

N. K. Senatoroff, Southern Counties Gas Co., discussed contemplated modifications in diethylene glycol dehydration plant construction to prevent overheating of glycol during distillation; to reduce the number of plates in the distillation column; and substitute a coil cooled by circulating water for the column reflux. H. M. Dwight took up the difficulties in one diethylene glycol plant caused by carryover into the plant of crude oil and pipeline deposits, recommending scrubber protection of the entering gas. Mr. Dwight stated also that the only difficulties in calcium chloride dehydration plant operation came from corrosiveness of the brine.

Two Pacific Gas and Electric speakers concluded the program for the first day: R. V. Dunkle read a paper on the superexpansibility of natural gas, which developed "deviation" data from pseudo-critical temperature and pressure relationships. Frank Wills duscussed the progress of research work on liquid-gas separation as conducted with transparent models.

Measurement and regulation were the general subjects discussed on the second day of the meeting. The program opened with Mr. Senatoroff discussing the use of lead instead of copper pipe for gas services. While use of lead pipe has not materialized because of the release of existing stocks of copper pipe, methods of usage were developed by Southern Counties.

W. A. McGlashen of Southern California Gas Co. described his new whistle type gravitometer used to determine the specific gravity or density of gas by adjusting the length of the whistle to sound a note of certain pitch gauged by resonant response.

C. P. deJonge of San Diego led a discussion of problems which will arise if companies are required to return to a 7-year meter change period (from the present 10-year period). While no difficulties were anticipated, hope was expressed that the 10-year period would continue long enough to develop meter accuracy data over such a period.

J. T. Cortelyou of Southern California Gas Co. described a company handbook on orifice meter measurement standards and reference data for experienced employees. Sections of the book designed for the new employee take up (1) coefficient and (2) chart reading, including visual reading, planimeter, and integrator.

Messrs. McGlashen and Corfield in discussing metering and control problems in butadiene manufacture took up several points where metering was difficult because of condensate in the gas to be measured. Operating control criteria for gas generators were described.

Final speaker was G. J. Sandusky of Southern California Gas Co. who presented the subject of large volume gas measurement. Commercial and industrial measurement personnel is divided into three groups: (1) field, inspection and repairs; (2) shop, repairs; and (3) office, calculations.

IOCC Executive Committee Announces Appointments

The executive committee of the Interstate Oil Compact Commission has announced several changes in personnel of the Research and Coordinating Committee.

These include: Walker T. Pound, conservation officer of the Oklahoma Corporation Commission, member of the committee succeeding Dan O. Howard, who has left to join the Navy; Lloyd L. Jordan, chief engineer, Arkansas Oil and Gas Commission, member to succeed Alec M. Crowell; Edward V. O'Rourke, professor of petroleum engineering, Ohio State University, Columbus, Ohio; L. B. Taylor, petroleum engineer, conservation division, Kansas Corporation Commission, Wichita, Kansas, chairman of the committee, and Dr. S. T. Yuster, associate professor of petroleum and natural gas engineering, Pennsylvania State College, Pennsylvania, vice chairman of the committee.

The committee also announced the appointment of E. G. Dahlgren, of Oklahoma City, Okla., as assistant secretary of the Commission.

Mr. Dahlgren serves as assistant to Charles L. Orr, secretary of the commission. For about two years Mr. Dahlgren has been technical secretary of the Research and Coordinating Committee of the Compact Commission and he retains this position.

PROGRAM FOR THE THIRD AGA WAR CONFERENCE ON INDUSTRIAL AND COMMERCIAL GAS

THE third war conference to be conducted by American Gas Association's Industrial and Commercial Gas Section, which will be held at Hotel Seneca, Rochester, N. Y., March 30 and 31, comes at a time when factories, mills and shops are using more industrial gas than at any previous time; when the greatest number of factory and mill workers are handling industrial gas equipment and are producing more and more output with industrial gas; and, also, when more people, military and civilian, are eating more meals away from their homes than at any other time. These conditions have created the greatest impact of the war on the gas load but, at the same time, have created the opportunity to learn new things and to develop opportunities from them. These will be explored thoroughly at the Conference, according to Eugene D. Milener, secretary of the Industrial and Commercial Gas Section.

The all-important reconversion period will receive full attention, as will post-war subjects.

Among the Paper to Be Presented and Their Authors

Clarence Birdseye—Trends in Prepared, Frozen and Dehydrated Foods.

General Hermon F. Stafford, Ordnance Department—American Armament on the Battlefronts.

Dr. C. K. Mees, vice president in charge of research, Eastman Kodak Co.—Scientific Research and Its Relation to Industry.

Herman Russell, president, Rochester Gas and Electric Corp.—Problems of Management in War Time.

Karl Emmerling, assistant general superintendent, the East Ohio Gas Co., and J. P. Leinroth, general industrial fuel representative, Public Service Electric & Gas Co.—Industrial and Commercial Gas Reconversion Problems.

E. N. Strait, chairman, AGA Rate Committee—Value of Commercial and Industrial Gas Load to Utilities.

W. R. Teller, chief research engineer, AGA Laboratories—New Information on Large and Small Gas Immersion Tubes.

F. B. Jones, general sales manager, Equitable Gas Co.—Rebuilding of Industrial and Commercial Gas Sales Personnel.

Charles G. Young, manager, Springfield Gas Light Co.—Progress of Industrial and Commercial Gas and Its Contribution to the War.

C. George Segeler, utilization engineer, AGA—Late Developments in Heat Treating and Melting Aluminum and Magnesium With Gas.

W. F. Friend, mechanical engineer, Ebasco Services, Inc.—Gas Air Conditioning Brought Up to Date—a Report and Analysis.

Lawrence E. Biemiller, assistant manager, Industrial Fuel Department, Consolidated Gas Electric Light & Power Co. of Baltimore—The Impact of New Processes and New Equipment on the Use of Gas.

Frank H. Trembly, Jr., assistant sales manager, the Philadelphia Gas Works Co.—Meeting Food Service Problems in a Changing World.

Carroll Cone, service engineer, Surface Combustion—New Horizons for Industrial Gas.

Robert C. LeMay, industrial gas engineer, the Connecticut Light & Power Co.—What Do the Colleges Think of Gas Equipment.

Hall M. Henry, vice-president, New England Gas & Electric System—What Do We Require for the Full Realization of Our Objectives in the Commercial and Industrial Gas Fields?

John Avery, assistant manager, Blower and Compressor Department, Allis Chalmers Co.—Gas Turbine Progress.

IOCC Meeting Changed

Dates for the Spring meeting of the Interstate Oil Compact Commission have been changed to April 3 and 4 instead of March 31 and April 1, as originally set, Charles Orr, secretary, announced. The meeting will be held at the Roosevelt Hotel, New Orleans.

Corrosion Engineers to Meet

The annual conference of the National Association of Corrosion Engineers will be held at the Rice Hotel in Houston on April 10, 11, and 12. G. R. Olsen of Shreveport is chairman of the program committee.

AGA Sets Up Natural Gas Department

THE Executive Board of the American Gas Association, at a meeting in Cleveland on Feb. 16, approved detailed plans for setting up the new Natural Gas and Manufactured Gas Departments recently voted by the Association's membership.

Under the new set-up, the Constitution provides for a Natural Gas Department and a Manufactured Gas Department, each with a vice president of the Association as chairman. The vice presidents will serve as ex-officio members of the Finance and Control Committee. Chairmen of these new departments are: Natural Gas Department—J. French Robinson, vice president of the Association and president of The East Ohio Gas Co.; Manufactured Gas Department—George S. Hawley, past president of the Association, and president of The Bridgeport Gas Light Co.

Further reorganization details are:

Natural Gas Department: This department will be headed by a Managing Committee, with Mr. Robinson as chairman. Other general committees will be an Advisory Committee, and a Nominating Committee. In addition, there will be a director of the department (a full-time employee of the Association, who will also be assistant managing director of the Association.

A Natural Gas Spring Conference will be sponsored by the Natural Gas Department, American Gas Association on May 11, 12 and 13, 1944 at French Lick Springs Hotel, French Lick, Indiana. Those wishing to attend should make hotel reservations as early as possible.

The program has not yet been completed but it is expected that it will include a symposium on the storage of natural gas and one on long distance transmission of natural gas. All phases of these studies will be considered and speakers will be selected from sections of the country in which such problems are of particular interest.

The following departmental committees have been established:

1. *Production and Storage Committee,* which replaces the former "Production Committee," and recognizes the increasing importance and development of underground storage of natural gas. It will handle matters relating to the producing of gas from wells, its storage and all related problems.

2. *Transmission Committee,* which will be concerned with the transportation of natural gas from regions of supply to market areas, and the design, construction and operation of transmission lines.

3. *Accounting Committee,* set up because certain operations in the natural gas business (depletion and underground storage, for example) are peculiar to it.

4. *Committee on Large Volume Sales,* organized in recognition of the fact that industrial gas sales in very large volumes usually constitute a much larger percentage of a natural gas company's sales than they do of those of a manufactured gas company.

5. *Technical and Research Committee,* which will continue the function of the former "Main Technical and Research Committee," initiating and conducting research on production, storage and transmission, and providing standards and methods for the determination of gas components and products.

The Natural Gas Department will hold a spring meeting each year, and its annual meeting will coincide with that of the Association.

Manufactured Gas Department: Chairman Hawley's announcement of plans for the Manufactured Gas Department called attention to the report of the Special Committee on Organizational Changes to the effect that few changes in organizations or functions would be required to bring them into conformity with the proposed reorganization.

Part of the set-up of the Manufactured Gas Department will include a vice president and chairman of the Managing Committee, an Advisory Committee composed of past chairmen and activities of the Gas Production Committee and of the Gas Conditioning Committee. Mr. Hawley called special attention to the substantial interest of the Manufactured Gas Department in the membership and activities of many Sectional Committees, including those of Residential Gas, Industrial-Commercial Gas, Technical and Accounting Sections; and such general committees as Publicity and Advertising, Rates, Post-War Planning, Personnel Practices, Accident Prevention, and Research. It was further provided that the Managing Committee may at any time appoint additional committees on manufactured gas problems.

Other Reorganization: The Wrinkle and Wrinkle Award Committees and the Committee on Vocational Education have been made general committees. The Residential Sales Committee becomes a subcommittee in the Residential Gas Section, and the Industrial and Commercial Sales Committee is transferred to the Industrial and Commercial Gas Section. The Accident Prevention Subcommittee is now a part of the general Accident Prevention Committee with representation from the Production and Storage, Transmission and Technical and Research Committees.

Buddrus Elected President of Independent Gas Group

DIRECTORS of the newly organized Independent Natural Gas Association of America met at Tulsa, Okla. Feb. 18 and elected E. Buddrus, Panhandle Eastern Pipe Line Co., Chicago, as president.

E. Buddrus

Other officers elected were: Paul Kayser, El Paso Natural Gas Co., El Paso, first vice president; J. H. Dunn, Shamrock Oil and Gas Co., Amarillo, Texas, second vice president, and F. W. Peters, Oklahoma Natural Gas Co., Tulsa, Okla., treasurer.

The following were named members of the executive committee: W. H. Wildes, president, Republic Natural Gas Co., Dallas, Texas; Joseph Bowes, president, Oklahoma Natural Gas Co., Tulsa; Paul Kayser, E. Buddrus, and D. D. Harrington, of Hagy, Harrington & Marsh, Inc., Amarillo, Texas.

The new orgnaization is formed to serve the interests of producers and transporters of natural gas and to represent the members before the Federal Power Commission and the Security Exchange Commission.

AGA Technical Section Conferences Announced

The following dates for the annual Spring conferences of the AGA Technical Section have been announced by Charles F. Turner, chairman of the section:

Twenty-first Annual Distribution Conference, Hotel Statler, Cleveland, Ohio, April 18 and 19—A. C. Cherry, Cincinnati Gas & Electric Co., chairman.

Joint Production and Chemical Committee Conference, Hotel Pennsylvania, New York City, June 6 and 7—V. J. Altieri, Eastern Gas & Fuel Associates, Everett, Mass., and F. J. Pfluke, Rochester Gas & Electric Corp., co-chairmen.

API Pacific Coast Meeting

The regular spring meeting of the Pacific Coast District of the American Petroleum Institute's Division of Production will be held March 23, 1944, in Los Angeles, Calif., to consider the petroleum supply situation on the Pacific Coast, oil on the public domain, and practical problems of drilling and production technology in wartime, it has been announced by W. L. Jarvis of The Texas Co., chairman of the program committee. Morning and afternoon sessions will be held in the Gold Room of the Biltmore Hotel, and an evening session in the Biltmore Bowl.

Indiana Gas Association Announces 1944 Convention

The 1944 convention of the Indiana Gas Association will be held at the Hotel Lincoln, Indianapolis, on May 15 and 16. A meeting of the board of directors will be held on the evening of May 14.

Members of the program committee are Tom Kemp, Indianapolis, chairman; C. V. Sorenson, Hammond; and Ed Hahn, Kokomo.

Lindberg Engineering Executives Buy Wheelco Instruments Co.

Assets of Wheelco Instruments Co., 847 W. Harrison St., Chicago, have been purchased by Fred A. Hansen and Cary H. Stevenson, vice presidents of the Lindberg Engineering Co., Chicago, and several associates. The business of the industrial instruments firm will be continued at the same location under a new corporation, the Wheelco Instruments Company.

Officers of the new company are Mr. Hansen, president; Mr. Stevenson, secretary and treasurer; and Richard Schoenfeld and Theodore Cohen, vice presidents of the old company, as vice presidents. Mr. Schoenfeld will be in charge of sales and production.

Wheelco Instruments Company owns a six-story building at Peoria and Harrison Streets, Chicago, where it manufactures a line of industrial instruments incorporating electronic control. The new company will expand further into other industrial applications of electronics and supersonics.

The original Wheelco firm was formed in 1936 by a merger of Wheelco Vacuum Products Co., maufacturers of electronic tubes, and Thermo Control Devices Co., manufacturers of industrial instruments. Sales and engineering offices are maintained throughout the country.

Messrs. Hansen and Stevenson will continue to be active in management of Lindberg Engineering Co.

New Company Formed to Gather and Transport Turner Valley Gas

J. H. McLeod, production manager of Imperial Oil and president of Royalite Oil, revealed in Calgary, Alberta, on Feb. 12 that a new company, to be known as Madison Natural Gas Co., Ltd. is to be formed for the gathering and transportation of gas in the Turner Valley Field. Madison, which will put its gas through a scrubbing plant to remove impurities and deliver it to purchasers, will be a Royalite subsidiary, operating in much the same manner as Valley Pipeline Co., which transports oil to Calgary from Turner Valley. Mr. McLeod's disclosure came as he recalled that all gas producers in Turner Valley, under legislation to come before the Alberta legislature shortly, will have an opportunity to share in the available market for gas. Royalite has enjoyed a monopoly in this respect for many years, although it has purchased some gas from independent companies for resale. Mr. McLeod said that Madison's pipeline system in Turner Valley will be a common carrier.

WPB Catalogs Surplus Steel Valves

A catalog of 30,690 new surplus steel valves of various sizes and types has been published for the use of war contractors or others, the War Production Board has announced.

The list was published by the Surplus Program Section of the WPB Redistribution Division in cooperation with the Metals Reserve Co. It indicates the type of valves, catalogue specifications, manufacturers' names, and state location.

The catalog is the result of a request last July by WPB for listings of all surplus steel valves. At that time 108,573 new steel valves were reported by user-holders as being available for sale. Since then, 44,184 of the valves have been sold. Of the July total, 33,699 were offered for loan by the holders subject to replacement on specific dates. These have not been included in the catalog.

The list is a 50-page document, including both multi-purpose and specific use valves. It will be available for inspection by steel valve users in WPB's regional or district offices. Claimant agencies will also have copies of the catalog available.

Canadian Municipal Ownership Movement

Twenty-nine British Columbia municipalities have agreed in principle, at meetings held in February in Vancouver, to a proposal for taking over the rights and assets of the British Columbia Electric Railway Co., including gas company subsidiaries which supply this fuel to the most important municipalities in the province. A committee named by the municipalities is to discuss the matter further with Premier John Hart. A Public Utilities Commission has placed a valuation of $75,000,000 on various B. C. E. R. assets, but Mr. Hart has declared this should not be considered binding as to the price the municipalities should pay.

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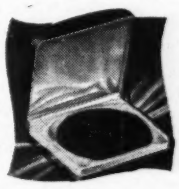

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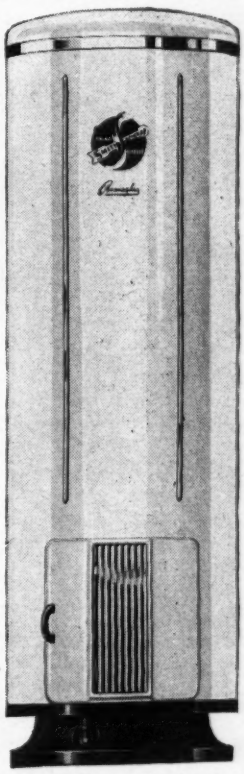

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PEOPLE

• The election of **John W. Batten** to succeed **William G. Woolfolk** as president of the Michigan Consolidated Gas Co. was announced Feb. 18 following the annual meeting of stockholders.

Mr. Woolfolk, who served 12 years as president, has been named chairman of the company, a newly-created office.

The demands of his duties as chairman and president of United Light & Power Co. and its subsidiaries, including American Light & Traction Co., which holds all common stock of the Michigan Consolidated Gas Co., necessitated his retirement from the presidency of the local company.

Batten rose through the ranks to the presidency, having joined the company in 1906 immediately after his graduation from the University of Toronto as a chemist and mineralogist.

For the last six years he has been vice president and general manager in charge of the Detroit district. He has been vice president since 1926.

Capt. Henry A. Fink was appointed general manager of the Detroit district to succeed Batten. **A. V. McRee** was elected secretary.

Adam Kurtz was reelected vice president and treasurer, and **Henry Tuttle** was retained as vice president and controller.

The new members named to the board of directors are Mr. Tuttle, **Thomas K. Humphrey,** Chicago, vice president and general counsel of United Light & Power Co., and **D. Dwight Douglas,** president of the Chicago, Duluth & Georgian Bay Transit Co.

• The following changes in the organization of the operating divisions of the Detroit district of the Michigan Consolidated Gas Co. were announced Feb. 18, 1944, by **Capt. Henry A. Fink,** general manager:

T. W. Weigele, formerly staff assistant, is appointed gas engineer. He will be in general charge of all the technical matters connected with the supply of gas to the district, including experimental engineering activities, the laboratories and such other special duties as may be assigned to him from time to time.

Frank J. Woolfenden, formerly superintendent of pressures, is appointed engineer of distribution design. He will be in general charge of the work of designing transmission and distribution systems, betterment-of-supply projects and the making of pressure surveys. He will authorize the gas pressures to be carried throughout the systems, issue and authorize the procedure for pressure controls for pipeline construction and maintenance and will also be in charge of electrolysis control for the company.

Louis G. Kreuz, formerly superintendent of production, is appointed assistant to the general manager. He will be in general charge of the operations of the production, stock, gas dispatching and main office building departments.

• Because of continuing ill health, **Edward S. Jones,** on Feb. 1 resigned as chief engineer for the Honolulu (Hawaii) Gas Co., the position being filled by **Lyman Gowans.** Mr. Jones will continue to work for the company in a consulting capacity.

He became ill in May of 1943 and, unable to return to the detail and responsibility of the Honolulu post, has decided to move to the mainland where he expects to serve his company as a representative for buying and construction work with offices in San Francisco.

Mr. Jones, well known throughout the industry and a 38-year member of the Pacific Coast Gas Association, is the brother of the late **Leon B. Jones,** who with his father, **Edward Campbell Jones,** designed the Jones gas generator. Leon Jones passed away in London, England, on Jan. 30, 1943, where he had been doing vital work for the British gas industry.

• **Glenn R. Chamberlain,** first vice president of Michigan Consolidated Gas Co., has announced the appointment of **Harry J. Gabel** as manager of the company's Big Rapids property, following the acquisition of the assets of the Big Rapids Gas Co. Mr. Gabel's office manager will be Evar Swarvar, heretofore in charge of the books of American Michigan Pipe Line Co., recently taken over by Michigan Consolidated. **John V. Rodenbeck** has been made manager of the company's Mt. Pleasant district.

• **M. H. North** is now supervisor of advertising and sales promotion for Oklahoma Natural Gas Co., Tulsa. He formerly held a similar position with Blackstone Valley Gas & Electric Co. of Pawtucket, R. I.

• **George L. Scofield,** general new business manager, Dominion Natural Gas Co., Ltd., Buffalo, N. Y., recently was named to serve on two of four subcommittees set up by the Canadian Gas Association's Post-War Planning Committee. Mr. Scofield was named chairman of the Engineering and Economic Aspects Subcommittee, general section, and also holds a post on the Competitive Factors Subcommittee.

• **Sidney B. Shaw,** automotive engineer of the Pacific Gas & Electric Co., has been appointed by the Office of Defense Transportation to serve as chairman of ODT's Regional Maintenance Advisory Committee. He has been in charge of P. G. & E.'s large fleet of commercial vehicles, having been employed by the company since 1912.

Necessary valve operating current is supplied by heat of pilot flame applied to thermocouple element. Failure of flame automatically closes valve which can be again opened by convenient push button. MR-2 is straight through gas type. Standard thermocouple length 30". Valve sizes: ⅜" to 1½". Available for manufactured or liquefied petroleum gases.

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• **A. E. Schwarz,** recently assistant to the director of labor relations, Cleveland Pneumatic Tool Co., Cleveland has rejoined Ebasco Services. Inc., of New York. His new work will consist of promoting the use of gas and electrical equipment. Prior to working with Clevland Pneumatic Tool Co., Mr. Schwarz had been with Westinghouse Electric and Manufacturing Co., Minnesota Power & Light Co., and Bryant Heater Co.

A. E. Schwarz

• **Chester S. Stackpole,** assistant manager, merchandising and domestic gas and electric sales, Consolidated Gas, Electric Light and Power Co., Baltimore, since 1928, has been made manager, succeeding **Dorsey R. Smith,** recently retired. Mr. Stackpole is chairman of the Water Heating Committee of the Residential Gas Section, American Gas Association.

• **Harry A. Wallace, Jr.,** President of United Fuel Gas Co., has announced that at a meeting of the board of directors on January 5 **E. E. Roth,** chief geologist of Columbia Gas & Electric Corp. was elected vice-president of United Fuel Gas Co., a subsidiary of Columbia.

• **John I. Yellott,** director of the Institute of Gas Technology, has announced the following new appointments to the staff of the Institute: **Joseph D. Parent,** research associate, formerly associate professor of chemical engineering at Kansas State College; **Elizabeth M. Rueck,** assistant chemist, previously head of war training courses in industrial chemistry at Illinois Institute of Technology; **Shiro Mori,** assistant chemist, a specialist in soil chemistry; **E. A. Munyan,** senior mechanical engineer.

• **Raymond C. Mayer** of New York has been elected president of the National Association of Public Relations Counsel, Inc., according to an announcement made Feb. 1 following the annual meeting of the Association held at the Hotel Lexington.

Through the years Mr. Mayer's agency has served the Association of Gas Appliance Equipment & Manufacturers, the Gas Industries exhibit at the New York World's Fair, and Servel, Inc.

• **P. R. Dunbar,** comptroller-treasurer of the Seattle Gas Co., Seattle, Wash., has been elected to membership in the Controllers Institute of America. The Institute is a technical and professional organization of controllers devoted to improvement of controllership procedure.

• **Frank Phillips,** chairman of Phillips Petroleum Co., has recently been elected a director of Missouri-Kansas-Texas Railroad Co.

• **William Svec,** formerly assistant head of the Houston, Tex., gas plant of Shell Oil Co., Inc., has been made head of the gas department of the company's Norco, La., refinery. Mr. Svec has been with Shell since 1930.

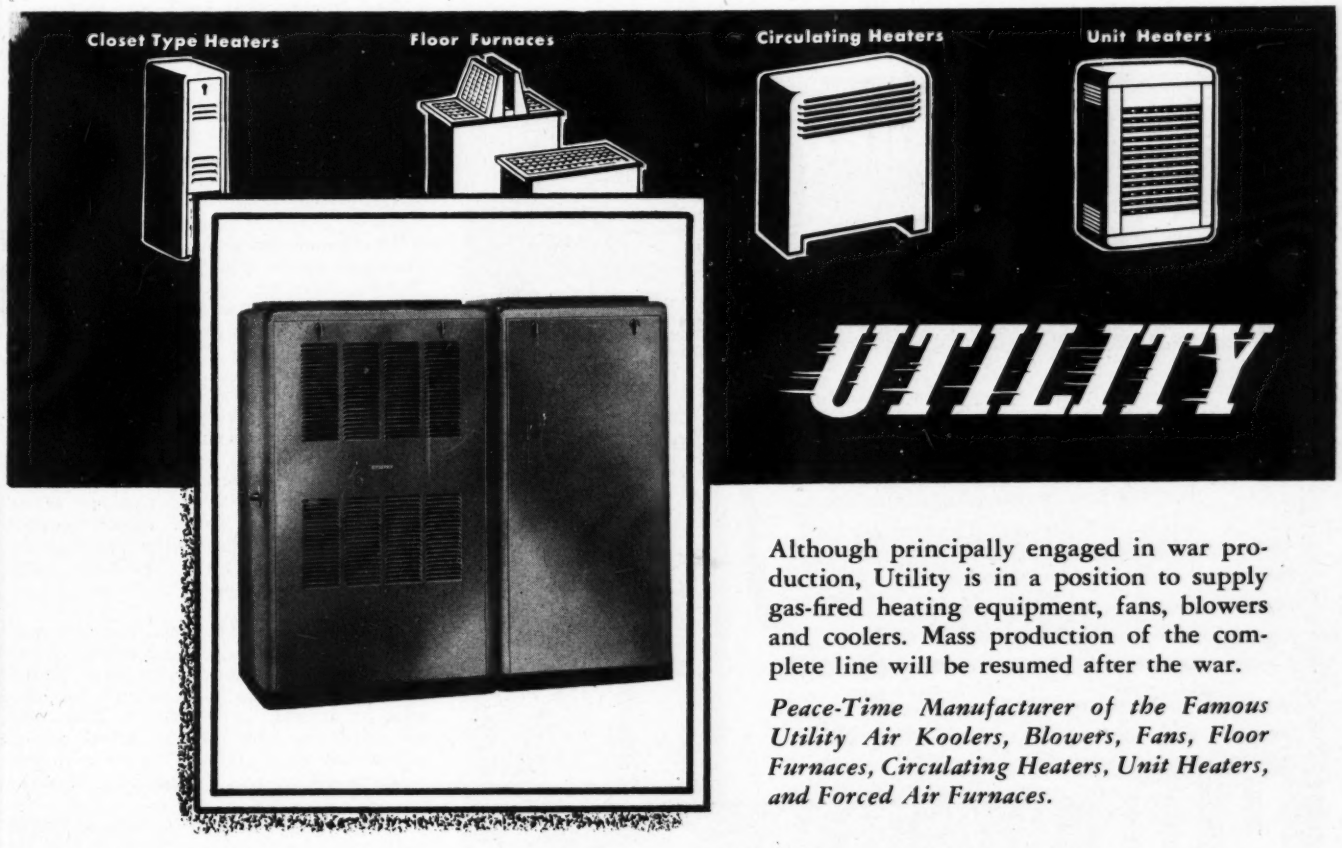
Manufacturers

• **John C. Pankow,** director of sales for Detroit-Michigan Stove Co., has just announced the appointment of divisional sales managers for the Southeastern Division and Northwestern Division.

• **E. F. Hamilton** will supervise sales of Detroit Jewel and Garland domestic gas ranges and Garland commercial cooking equipment in the southeastern states, with headquarters in Atlanta.

Ray M. Houdek will serve in a similar capacity in the northwestern states, operating from Kansas City. Both men have been associated with the company for several years as sales reprentatives in these areas.

• **J. P. Williams, Jr.,** president, Koppers Co., recently announced the election of **George M. Carvlin** as a vice-president of the company, Engineering and Construction division. Mr. Carvlin has been with Koppers since 1925, and prior to his present appointment was assistant to Joseph Becker, vice-president and general manager of the division.



Although principally engaged in war production, Utility is in a position to supply gas-fired heating equipment, fans, blowers and coolers. Mass production of the complete line will be resumed after the war.

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• **J. J. Donovan** has been named regional manager of the Chrysler Airtemp New York office, according to a recent announcement by Paul B. Zimmerman, vice president and general sales manager. Mr. Donovan will direct Airtemp sales and service activities in the greater New York area and New England.

Since 1941 Mr. Donovan has been associated with the War Production Board, Washington, D. C., as assistant director of the Automotive Division.

Prior to his work with WPB, Mr. Donovan had wide experience in the refrigeration and air conditioning industry, entering the refrigeration business in 1923 with Frigidaire. He later joined the electric refrigeration department of the General Electric Co., and remained with that company until 1939, when he formed his own company, Wildon, Inc. During 1940 he was associated with Servel, Inc., on a special assignment.

He has been vice president and chairman of the Standard Committee of the Air Conditioning and Refrigeration Manufacturers' Association, chairman of the Finance Committee, Oil Burner Institute, and a representative of the ACRMA on the Joint Refrigeration Industries Code committee.

• **Cliff S. White** has been appointed district representative for Airtemp Division, Chrysler Corp., according to a recent announcement by Edmund A. Orrell, northern sales supervisor. Following preliminary training in Dayton, Mr. White will take up an assignment in the Cincinnati territory.

Mr. White's experience in the refrigeration industry was gained through an association with C. V. Hill & Co., commercial refrigerator manufacturers, over an 11-year period.

• **William O. Wilson** of Evanston, Ill., has been appointed commercial vice president of Worthington Pump & Machinery Corp., according to a recent announcement from the corporation's general offices. Mr. Wilson has been with Worthington and its predecessor companies since 1898, except for the two-year period of 1911-13. In his new capacity he will be responsible for all of Worthington's commercial activities in the Chicago, St. Louis, Kansas City, and St. Paul district office territories, with offices at 400 W. Madison St., Chicago.

• **Dolph Jansen, Jr.,** assistant sales promotion manager of Servel, Inc., Evansville, Ind., has recently resigned to become associated with the Zenith Radio Corp. as assistant sales manager of their newly formed radionic hearing aid division.

Mr. Jansen came to Servel in 1935 as assistant to the sales promotion manager in their New York office, and in 1937 was transferred to Evansville, Ind., as assistant sales promotion manager.

• According to announcement by **B. D. Klein,** president, Gas Purifying Materials Co., Inc., Long Island City, N. Y., **Bertram L. Klein,** formerly assistant sales manager of the company, has been made assistant vice president and sales manager.

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On Active Duty

• **Lt. Col. J. C. "Jeff" Jefferson** of Edmonton, Alberta, a 20-year employee of Northwestern Utilities and one of Canada's heroes of Sicily and Italy, recently was promoted to the rank of brigadier. Col. Jefferson was officer commanding the Loyal Edmonton Regiment throughout the fighting in Sicily and received his promotion while leading the regiment in Italy. For outstanding bravery in the Sicilian fighting he was awarded the Distinguished Service Order, one of the British Empire's highest military decorations. The Loyal Edmontons have been fighting for some time as part of the British 8th Army, and Col. Jefferson received his D-S-O in a ceremony on Italian soil from General Sir Bernard Montgomery shortly before the famed British military leader left to assume his "invasion" post in Britain under General "Ike" Eisenhower.

• **Major Francis R. Blankenship,** formerly engineer for Westgate Natural Gas Co., Oklahoma City, Okla., is now director of the engineering division of Army Service Forces Technical Training Command at Camp Gordon Johnston, Fla.

• **Major Leon E. Bell,** formerly petroleum engineer at Rodessa, La., for United Gas Pipe Line Co., has completed the general staff and command school course at Leavenworth, Kans., and is now on General Marshall's staff at Washington, D. C.

• **Morris L. Andersen,** formerly an engineer in Southern California Gas Co.'s Visalia division, is now a major in the Army Ordnance Department, stationed at Maynard, Mass.

• **Charles G. Simpson,** former personnel manager of the Philadelphia Gas Works Co., has been promoted to major. He is employee relations officer at the Third Service Command Headquarters in Baltimore, Md.

• Triple honors have been bestowed upon **Lieut. Thomas Lavelle Murphy,** recently awarded the Distinguished Flying Cross, the Soldiers Medal for saving the life of a bombardier after a crash landing in the Bay of Bengal, and the Air Medal for his exploits in India. Lieut. Murphy is a former employee of the gas distribution department of the Arkansas Natural Gas Corp., Shreveport, La.

• **Lieut. Collis P. Haynes,** former junior accountant in the general office of the plant reclassification department, United Gas Pipe Line Co., Shreveport, La., and now stationed in England, has been awarded the Air Medal after having completed 11 raids and 14 combat missions to Germany, France and Norway.

• **Lieut. Arthur F. Warden,** formerly cashier and customers clerk in the Pacific Gas & Electric Co., San Luis Obispo, Calif., now a navigator with the 10th Air Force in India, has won the Air Medal for outstanding heroism during aerial missions in China and Burma.

• **Walter B. Kirk,** assistant chief research engineer of the American Gas Association testing laboratories, has been commissioned a lieutenant (j. g.) in the U. S. navy. Volunteering for special duty, he reported to Princeton University on September 15 for basic training and indoctrination following which he is slated for sea duty as deck officer on one of our fighting "small craft."

• **Joe Wissman** of the United States coast guard was recently promoted from ensign to lieutenant (j. g.). Formerly engineer at the Gas Service Co. (Kansas City) in Parsons, Mo.

• Second Lieutenant **Robert G. Delcamp,** formerly in the auditing and tax department of the Southern California Gas Co. and now stationed with the Tenth Air Force in India, has been awarded the Air Medal.

Obituaries

• **Victor A. Ogilvie,** director and assistant treasurer of Gas Advisers, Inc., died on Jan. 9 at his home in Ridgewood, N. J.

Mr. Ogilvie had been associated with the Cities Service Co. system since 1917, when, upon graduation from Iowa State College, he went to Denver Gas & Electric Light Co. Since that time he had been engineer in the gas distribution department of the Empire Companies, chief engineer of Dominion Natural Gas Co., Ltd., and Republic Light, Heat & Power Co., Buffalo. During the past 13 years he had been in New York doing work relating to all phases of gas engineering for natural gas and natural gasoline properties in Colorado, Texas, Oklahoma, Louisiana, Kansas, Arkansas, Missouri, and New York. In 1941 he served as a member of the staff of the priorities section of the power branch of the Office of Production Management.

Mr. Ogilvie was an active member of the AGA, a member of the Wrinkle Committee since 1935, and chairman of that committee in 1941 and 1942.

• **John M. Jervis,** 47, supervisor, industrial division, Cincinnati Gas & Electric Co., Cincinnati, Ohio., died Jan. 25 after an illness of several months. Before serving in the navy in World War I Mr. Jervis worked in the electric meter department of Cincinnati; in 1930 he rejoined the company, serving as salesman in the industrial gas sales division and field supervisor in the gas heating sales division of the Middletown and Cincinnati districts, before becoming supervisor of the industrial division.

• **Uriah J. Barr,** manager of the Sarnia, Ontario, branch of Union Gas Co. of Canada, died Jan. 31 at his home in Sarnia. He had been associated with the company for 15 years, having been chief accountant for nine years at the company's head office in Chatham, Ontario. Prior to that he had been connected with natural gas operations in western Canada for a number of years.

• **John C. Brown,** manager of the southeastern sales division of American Stove Co., died in Atlanta, Ga., on Dec. 26. Mr. Brown started with the George M. Clark Co. division of American Stove Co. in 1909, and was made manager of the southeastern sales division at the time of the introduction of the Magic Chef gas range.

• **Garnet W. McKee,** inventor, gas engineering authority, and head of Eclipse Fuel Engineering Co., Rockford, Illinois, died recently. Mr. McKee had been in the gas industry in the United States since 1904, when he joined the Detroit Gas Co. as chemist. He had also been associated with the Peoples Gas Light & Coke Co., Chicago, the Chicago Industrial Appliance Co., before going to Rockford in 1910 to found the Eclipse Fuel Engineering Co. Mr. McKee held more than 100 patents on a variety of devices, including a variable speed motor control, a thermostat, and gas burner controls.

• **E. S. Criswell,** 58, secretary and director of National Tube Co., died at his home in Pittsburgh, Pa., on Jan. 28. Before going to National Tube Co. in 1936, he had been general attorney, secretary and director of Oil Well Supply Co. in Pittsburgh, and remained with that organization when it became a subsidiary of United States Steel Corp.

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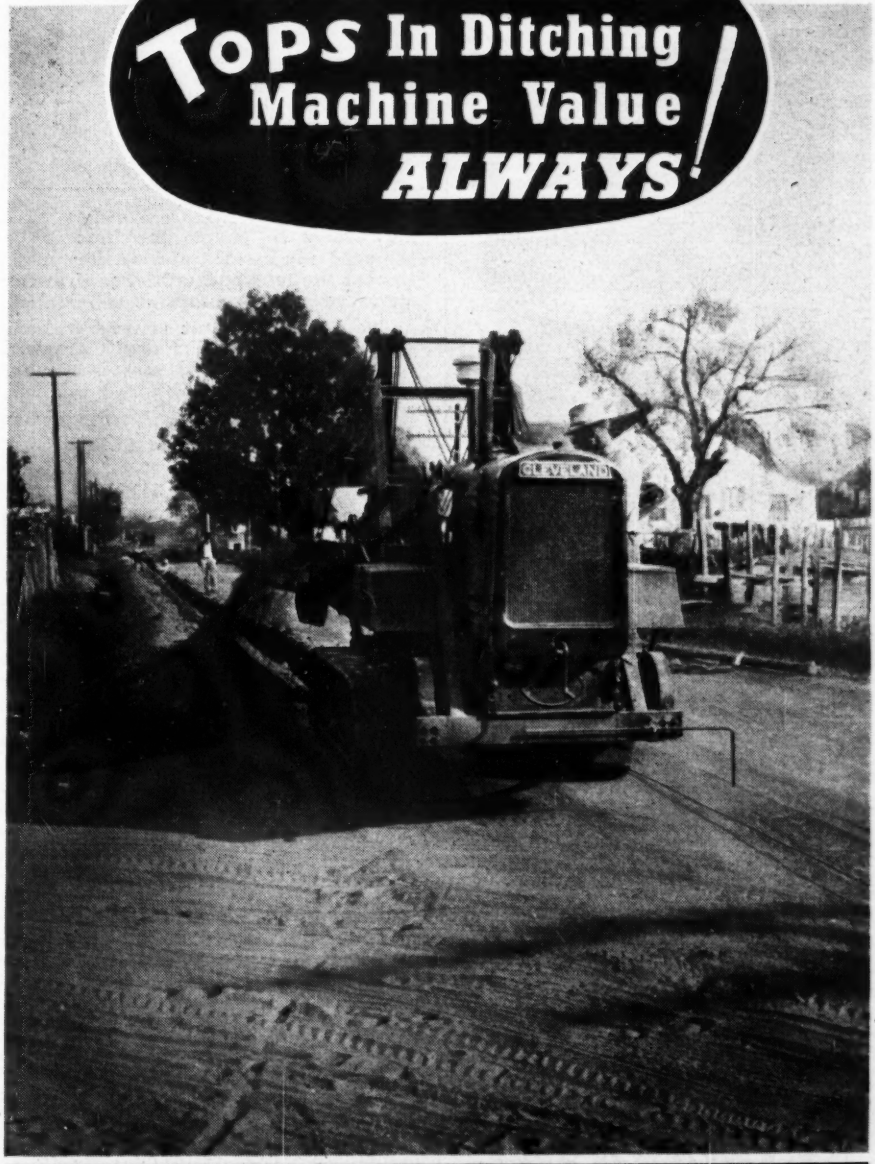

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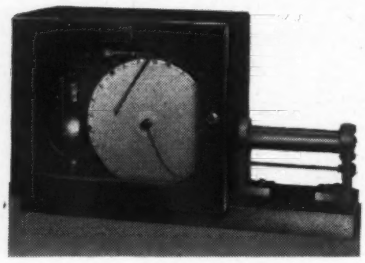

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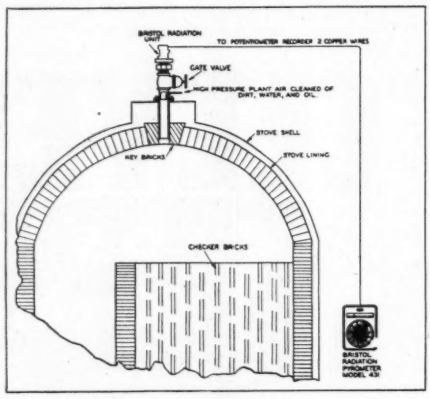
NEW PRODUCTS

Temperature Recorder

The Bristol Co., Waterbury 91, Conn.

Product: Stove Dome Temperature Recorder.

Application: A fixture adapting Bristol's Radiation Unit to the measurement of stove dome temperatures.



Description: The fixture consists of a gate valve to enable the unit to be removed for service and an air purge to cool the lens and unit. The drawing shows how the equipment is installed.

The Radiation Unit is used in conjunction with Bristol's new Pyromaster Potentiometer Pyrometer. Further information can be obtained on both the special fixture and the instrument from the Bristol Co.

Goggle Cleaners

Mine Safety Appliances Co., Thomas and Meade Sts., Pittsburgh 8, Pa.

Product: M.S.A. Goggle Cleaning Cabinet.

Application: For mounting in strategic work locations and in repair rooms, locker room, or on traveling goggle dispensing carts—to encourage workmen to wear their goggles and keep them clean.

Description: The cabinet is compact in size and is equipped with Fogpruf, an efficient lens cleaning and antifogging agent, and optical wiping tissues. Two vials of Fogpruf are concealed within the dispensing block, permitting the cleaning of two pairs of goggles at one time. A tap on either button of the dispenser sprays Fogpruf on the lens. Cleaning tissues are withdrawn from an opening in the top of the dispensing station. The product is fully described in Bulletin CE-24, available from the manufacturer.

Fire Shield

American-La France-Foamite Corp., Elmira, N. Y.

Model: Foamite Fire Shield.

Application: Portable shield for protection in fighting fire out in the open, in tank farms, refineries, air fields, etc.

Description: Unit is ruggedly built for hard, tough service of sheet steel reinforced with strong angle irons. Between front and back plates is insulating mineral wool blanket one inch thick capable of withstanding temperature of 1200° F. Three observation ports and four nozzle ports are equipped with pivoted cover doors controlled from rear of shield. Anchoring chains are provided for securing playpipes in place.

At base of shield are three hinged skirts which give way on meeting any ground unevenness. Wheel carriage is bolted to shield body so that parts may be packed knocked down to permit of minimum transportation space. Rear supports add stability; full length handlebar extends full width of shield at top. Two short handles, normally hanging down, may be used to maneuver shield at scene of fire.

Welder

Wilson Welder and Metals Co., Inc., 60 E. 42nd St., New York, N. Y.

Model: All-Weather "Bumblebee" AC Welder, 300 and 500 amp. capacities.

Description: These machines are similar to the standard Wilson "Bumblebee" AC welders, except that they have special moisture-proof insulation throughout, and all parts are protected by a heavy coating of moisture-proof paint. The outer case is finished in a durable weather-resisting enamel and has gaskets and louvers designed to prevent entrance of rain.

In addition, the All-Weather Wilson "Bumblebee" is equipped with a low voltage contactor which automatically holds the open circuit voltage at approximately 40 volts. When the operator strikes the arc, the low voltage contactor closes instantly and the transformer's performance thereafter equals that of machines not similarly equipped. When the arc is extinguished, this device immediately reduces the voltage back to 40 volts. These products are distributed by Air Reduction Sales Co.

Catalogs

• **The Askania Regulator Co.,** Chicago has released a 14-page bulletin entitled, "Askania Pressure Control." It describes completely the application of the company's regulator equipment to pressure and flow control problems. Installation photographs and diagrams show how the equipment is used.

One of the features of the bulletin is the valve sizing chart. This chart, published for the first time, shows how butterfly valve sizes may be determined in a quick and easy manner. Ask for Bulletin No. 100.

• **Metallizing Co. of America,** Chicago pioneer manufacturers of metal spray equipment, has just published a new 40-page catalog which deals with all phases of the metallizing process. This new book is actually an encyclopedia on metallizing applications, with each page crammed with interesting, factual information on how this vital process is saving time, money and precious metals in production, maintenance and corrosion prevention.

All information contained in the book is classified according to industry and covers every major field in which metallizing is used. In addition, a section of the book is devoted to the history, development, use and technique of metallizing. The Mogul metallurgical gun is fully illustrated and described part by part, with complete specifications and engineering data. Likewise, the accessories which are included in a typical metallizing set-up are shown.

• **The Bristol Co.,** Waterbury 91, Conn., has published a new Pyrometer Accessory Manual, No. P1211, giving engineering data on the selection and installation of thermocouples, protection wells, and lead wire; thermocouple and protection well assemblies; and calibration data and tables. The bulletin also includes information on molten metal thermocuples, radiation couples, surface contact couples, and special fittings and adopters.

• **Handy & Harman,** 82 Fulton St., New York 7, N. Y., has recently issued Low-Temperature Brazing News No. 24, covering the use of Easy-Flo Brazing Alloy in the production of guns. The four-page illustrated leaflet shows how Easy-Flo has been the means of simplifying the fabrication of various types of gun parts.

• **Automatic Temperature Control Co., Inc.,** Philadelphia, Pa., has published Catalog A4, describing their ATC Type Automatic Valve Operators. The product is a mechanism designed for the industrial operation of valves, dampers or other control devices between two adjustable positions for the regulation of temperature, pressure, flow or level. The catalog presents both photographic and descriptive information on features of engineering and design, and operating data. Valves commonly mounted to the unit are illustrated, and tabular data on dimensions and operating force are listed.

• **The Jam Handy Organization,** Detroit, has just issued an 84-page catalog on the subject of slidefilms and motion pictures to help instructors. This type of picture is frequently used by large plants in training skilled and unskilled workers, and the Handy catalog lists numerous discussional films applicable to the metals industry. Among the subjects treated in the publication are: aviation and aviation mechanics, automobile mechanics, chemistry, electricity and electrical shop, industrial relations, metal shop, safety, etc.

Midwest City, Okla., Natural Gas Franchise

Midwest City, Okla., a town of 5000 inhabitants (composed entirely of war workers and their families), voted on Nov. 30 to grant a natural gas franchise to the Oklahoma Natural Gas Co. For the past year and a half, because of its desire to give this rapidly growing war-born town the modern facilities it needed, Oklahoma Natural had been serving the town without a franchise agreement, extending its service as growth demanded. There were no opposing votes to the granting of the franchise.

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CURRENT READING

The Vibration Characteristics of "Free-Free" Circularly Curved Bars—Taken from a recent issue of the "Journal of Applied Physics," the material in this reprint was prepared and written under the direction of W. A. Pliskin, J. E. Edwards, and F. P. Bundy, with the collaboration of engineering officials of the Cooper-Bessemer Corp. The paper deals with experiments conducted to determine certain vibration characteristics, the results of which furnish data which make it possible to calculate with reasonable accuracy the frequency of vibration, parallel or transverse, of any incomplete, free-free, circularly curved bar of uniform cross section where its mechanical constants are known. Copies of the reprint may be obtained from the Cooper-Bessemer Corp., Mount Vernon, Ohio.

Manual of Welded Steel Tubing for Heat Exchanger and Condenser Use—Because of the great demand for heat exchangers, condensers and other types of heat transfer apparatus in the construction of new equipment for the production of synthetic rubber and of aviation gasoline, there has been a large expansion in the manufacture of welded steel tubing for heat exchanger and condenser use. This manual has been prepared by the Formed Steel Tube Institute to furnish complete information on this product to manufacturers and users of all types of heat transfer equipment. Topics included are: an illustrated description of the welded tube manufacturing process, a discussion of the method used to identify each welded tube manufacturer's product, suggestions for the placing and filling of orders, fabricating data and tables of tube properties for use in calculating surface areas, carrying capacities, displacements, etc. Copies are obtainable from Formed Steel Tube Institute, 1621 Euclid Avenue, Cleveland.

Preventing Welding and Cutting Fires—A 16-page, pocket-size booklet designed to instruct users of welding and cutting equipment in reducing potential fire losses, issued by the International Acetylene Association. It contains brief discussions of the chief causes of fires, and measures for preventing them. Copies may be obtained in reasonable quantities wthout charge directly from the International Acetylene Association, 30 East 42nd Street, New York 17, N. Y., or from any manufacturer of oxygen, acetylene, carbide, or welding and cutting equipment.

Methods of Inspection for Pressure Vessels and Piping—W. D. Halsey. "Combustion," Nov., 1943, pp. 45, 46. The author reviews the applications and limitations of various forms of inspection to determine the soundness of welds. These include visual inspection, X-ray and gamma-ray examinations, sampling at selected points along the weld and the employment of magnetic powder. Above all, he stresses the importance of competence on the part of the welder.

Bureau of Mines: I. C. 7261—Recent Developments in Fuel Supply and Demand—A. C. Fieldner.

Correlating Adsorption Data—D. F. Othmer and F. G. Sawyer, "Industrial and Engineering Chemistry," Dec., 1943, pp. 1269-1276. Equilibrium vapor pressures of gas or vapor adsorbed on activated carbon or other substances are correlated with the temperatures of adsorption and the concentrations of gas or vapor by the graphical method described in a previous article. The equilibrium vapor pressures of an adsorbate out of a solid adsorbent are plotted against the normal vapor pressures of the same or a different material at corresponding temperatures to give straight line (isosteres) on a logarithmic plot. The usual advantages of a straight-line relation are obtained; and their slopes are equal to the rations of the molal heats of adsorption to the molal latent heat of the reference substance. The heats of adsorption may be calculated from this relation; the calculations check calorimetric data closely. These methods of plotting and using data are of help in the design of adsorption systems when only a small amount of data are available.

Solution for Arkansas River Crossing Problems of WEP Pipe Lines—P. Reed. "Oil and Gas Journal," Dec. 2, 1943, pp. 60-62. By following the progress of WEP operations after the 24-in. line broke at the Arkansas River through the various stages of building a 20-in. by-pass and relaying the 24-in. oil line, together with laying the 20-in. products line, it is possible to present information which has not been previously published. This article serves as a comprehensive survey of the unusual measures applied in solving the problems of this undertaking which is now nearing completion. Precedents set will influence future river-crossing projects.

Rate-of-Flow Chart Devised for Natural-Gas Pipe Lines—G. W. Carpenter. "Oil and Gas Journal," Dec. 23, 1943, p. 52. Several methods of rapid translation of readings of differential and static pressures from an orifice meter into rates of flow have been devised by field men, but these methods usually involve complicated mental calculations and are of limited accuracy. The chart shown has been especially prepared to facilitate rapid and reasonably accurate determination of rate of flow. Examples of its use are given.

Use of Gas in Heat Treatment of Aluminum and Magnesium Alloys—Report of Subcommittee on Project No. 1 of the Metal Treating and Melting Committee, C. George Segeler, chairman. A comprehensive treatment of the subject is given in a 41-page booklet available through the Industrial and Commercial Gas Section of AGA, 420 Lexington Ave., New York City.

Calculating Pipe Sizes for Compressor Cylinders—B. C. Thiel. "Petroleum Engineer," Nov., 1943, pp. 135, etc. A new method of determining diameter of suction and discharge lines.

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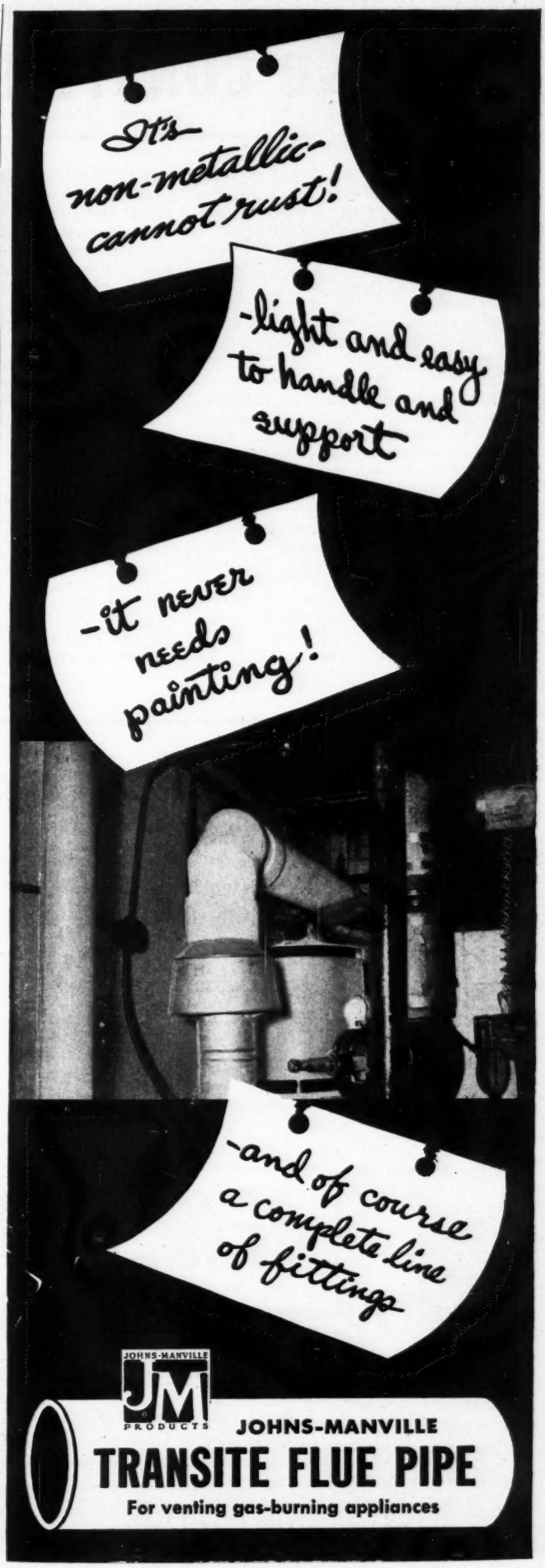

PIPELINE CONSTRUCTION

• Construction on both line and stations along the route of the 1200-mile 24-in natural gas line from Corpus Christi, Tex. to the Kentucky-West Virginia area is being pushed by **Tennessee Gas & Transmission Co.**

Williams Bros. Corp. is working on spreads east from the Ouachita and Mississippi rivers and west from the Tennessee-Kentucky boundary; and Bechtel-Dempsey-Price on one east from Batesville, Miss.

Bechtel-Dempsey-Price, in preparation for construction of the 259-mile Kentucky section of the line, have opened new offices in the Bank of Commerce Building, Lexington, Ky., John T. Foster, office manager.

Wet ground is causing delays in work in Texas, where Henry Lemons & Co. have been constructing gathering lines in the Corpus Christi area. Williams Brothers Corp., N. A. Saigh Construction Co., and Brown & Root, Inc. are scheduled to begin work on spreads in Texas about March 15.

National Tube Co. and A. O. Smith Corp. have delivered more than 200 miles of pipe to all spread locations along the route.

In order to extend the system beyond the eastern terminal of the 24-in line, the Tennessee company has bought 85 miles of 20-in. pipe. Contracts for laying this pipe will be let about March 1, and work will start in April.

Construction is in progress at stations No. 6, Monroe, La.; No. 8, Batesville, Miss.; No. 10, Lobeville, Tex.; and No. 12, Campbellsville, Ky.; and building of the dehydration plant at the initial station at the western end of the line is well advanced.

• A construction project to make more natural gas available in the San Francisco Bay area and hence aid the government's oil conservation program is being put through by the Standard Pacific Gas Line, Inc., a corporation formed in 1930 by the **Standard Oil Co. of California** and the **Pacific Gas and Electric Co.** This Corporation—known in the industry as **"Stanpac"**—was organized for joint construction and operation of a large pipeline to transmit natural gas from the Kettleman Hills oil fields to San Pablo, Contra Costa County, where it ties in with the network that serves the East Bay territory. But, soon after Pearl Harbor a great portion of this pipeline was released at the request of the Navy for the delivery of oil to refineries in the Bay area, and since then Stanpac has cooperated with Pacific Gas and Electric in providing facilities to transmit increased quantities of natural gas from the Rio Vista field, about 60 miles northeast of San Francisco.

The project will substantially increase the capacity of a tranmission main, of 8-in. and 12-in. pipe, which extends from the east side of the Rio Vista field to San Pablo. As one part of the job, a 6580-ft. stretch of 8-in. pipe has been replaced with 16-in. pipe. In addition, 24,350 ft. of 16-in. pipe is being laid parallel to another stretch of 8-in. line.

The project will cost $227,000 and will be completed by May. It will assure a considerably greater supply of natural gas for a wide variety of industries in Contra Costa County.

• Completion of the 230-mile, 26-in., natural gas pipeline of the **Cities Service Transportation & Chemical Co.**, being constructed from the Guymon, Okla., sector of the Hugoton field to Blackwell, Okla., is not expected by officials of the gas company until April 1.

Original completion date was February 1, but bad weather and other difficulties have delayed construction of the line.

The Cities Service Gas Co. has petitioned the Federal Power Commission for permits to enlarge and extend the facilities of this line by installing seven 1000 hp. gas compressor units and related equipment on the line at a cost of $1,298,354.

It also would construct cooling towers at its Blackwell station and build a 16-in., 35-mile loop from properties in Osage County, Okla., to the Blackwell station. This improvement would cost $724,300.

Capacity of the line would be raised to 213,000,000 cu. ft. of gas daily by Oct. 15 of this year, if these improvements are made.

• The **Hope Natural Gas Co.** and the **New York State Gas Co.**, subsidiaries of **Consolidated Natural Gas Co.** have recently presented to the Federal Power Commission a proposal to construct pipe lines for the distribution of natural gas in northern Pennsylvania and western New York—the gas to be obtained from the **Tennessee Gas & Transmission Co.**

At the same time, **Manufacturers Light & Heat Co., Manufacturers Gas Co., United Fuel Gas Co.,** and **Home Gas Co.**, subsidiaries of **Columbia Gas & Electric Co.** sought permission from the same body to serve the same area, with gas from the same source.

• **Texas Pipe Line Co.** is removing the 72-mile 6-in. natural-gas line from the Salem field to The Texas Co. refinery at Lawrenceville, Ill., because of insufficient gas supply, and because the pipe is needed at points in Louisiana and elsewhere for The Texas Co. operations. The work is being done by the Perry Construction Co.

OVER THERE ★

Because the Spencer Snap-Acting Disc is urgently needed in controls for war, they are no longer available to manufacturers of gas equipment. Instead, they're "over there" in tanks, planes, trucks, helping to win Victory.

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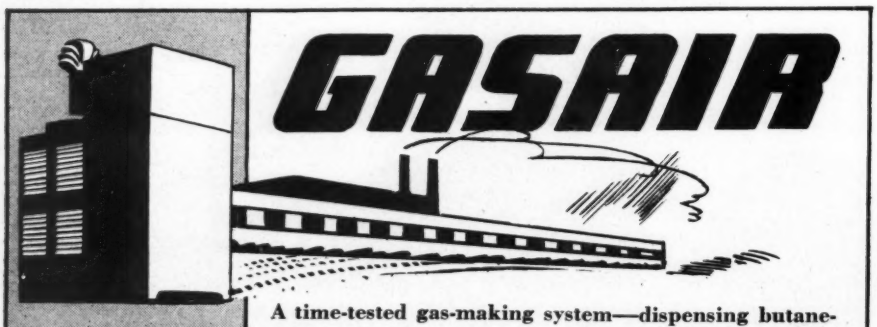

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Washington Orders

Housing Utilities Standards, WPB, (as amended Feb. 15, 1944): These Standards supersede the Housing Utilities Standards and Interpretations issued Aug. 25, 1942. They are to be used by utilities and builders of war housing in the design and construction of on-site and off-site facilities to provide electric, gas and water facilities to housing, as required by Supplementary Utilities Orders U-1-d and U-1-h and such other War Production Board Orders as from time to time may refer to these Standards.

They do not replace the utilities construction standards set out in Schedule I of Supplementary Utilities Order U-1-f. At present they are applicable only where there is construction or remodeling of the dwelling to be served which requires an authorization from the War Production Board to begin construction or remodeling, under Conservation Order L-41.

Maximum Main and Service Allowances for Water and Gas Facilities.

1. The total length of water or gas mains and services to be built to serve single family detached dwelling units in the housing project, shall not exceed, respectively, in lineal feet, 150 times the number of such units in the project.

2. The total length of water or gas mains and services to be built to serve any type of dwelling except a single family detached dwelling unit in the housing project shall not exceed, respectively, in lineal feet, 130 times the number of such units in the project.

These main and service allowances shall be reduced by the length of any exterior pipe furnished by the builder.

Natural Gas (General Directive 1-A under U-7): Sixty natural gas distributing companies in a six-state area are forbidden by OWU to make deliveries from Feb. 14 to March 31 to commercial or industrial customers who have adequate stand-by facilities capable of burning fuel other than natural or liquefied petroleum gas, the War Production Board reported today.

The companies affected, located in Missouri, Michigan, Illinois, Indiana, Ohio and Kentucky, draw supplies from the Panhandle Eastern Pipe Line Co., which moves substantial quantities of natural gas eastward from Texas and Kansas. Curtailment of deliveries to these states will make larger quantities of gas available to the Appalachian area where a shortage of natural gas is the threatennig war production.

Controls over deliveries of the fuel have been extended in a move to alleviate this shortage and the action is expected to provide an additional 20,000,000 cu. ft. of gas a day to war plants.

Restrictions heretofore have applied only within the Appalachian area, defined as Virginia, West Virginia, Maryland, Ohio, Pennsylvania, New York, District of Columbia and northwestern Kentucky.

Supplementing the new order is a special directive addressed to the Panhandle Eastern, requiring it to move all surplus gas to the Appalachian area.

Natural Gas (U-7): The modification Feb. 11 of Order U-7, which in general had limited the use of gas for residential space heating to installations that were in use at the time the original order became effective, makes it permissible to add to or replace existing gas heating installations with new equipment. Three classes of customers, formerly prohibited from using gas heat in their homes, are benefited:

1. Those building new homes.

2. Those who have no other kind of heating equipment installed in their homes.

3. Those who have gas heating equipment already installed, but who were prohibited from using it under provisions of the original limitation order.

Restrictions on the delivery of gas for non-residential heating are also modified by the order. Provided that all other requirements are satisfied, a non-residential customer may now receive up to 50,000 Btu. of gas for heating.

Gas Ranges (L-23-c): WPB announced on Feb. 9 that simplified models of gas cooking stoves which are now on the market will be the only ones available for some time, although consideration is being given by WPB to the removal of restrictions on stove production. Even if such relaxation is made, the time lag between allocation of material and actual production would probably run about six months.

Discussion of a proposed amendment to the domestic cooking appliance and domestic heating stove order, L-23-c, was the main concern of the Industry Advisory committee at its January meeting with government officials in Washington.

The principal change under the proposed amendment to Order L-23-c would be permission to resume production of standard model gas ranges. Only victory models with three or four top burners are permitted under the present order. The proposed change would permit production of standard gas ranges 35 in. to 40 in. plus a three and four burner cooker. No increase in unit production is proposed.

The proposed amendment would remove restrictions on production of accessories such as thermostatic or oven controls. The supply of valves is for the most part adequate.

Production would be on a quota basis, the quota being based on the number of units produced by each manufacturer during the base year, July 1, 1940 to June 30, 1941.

Boilers (M-293): Restrictions on production of boilers for stock have been made applicable to the types subject to the scheduling jurisdiction of the Plumbing and Heating Division, the War Production Board, Feb. 1. Such boilers are those generally used in domestic plumbing and heating installations.

The action prohibits the manufacture for stock of high and low pressure steel boilers of the types listed in Table 14 of General Scheduling Order M-293 without the specific authorization of WPB.

Iron Pipe: Cast iron soil pipe and cast iron soil pipe fittings were Feb. 7 freed by the WPB from all restrictions formerly imposed by General Preference Order M-21.

"CONSERVE ALL FUELS"

THE ABOVE illustration and headline typify a series of advertisements sponsored by the P.C.G.A. in western trade journals. The Association is also publishing full-page conservation messages in domestic magazines.

NO ACTUAL SHORTAGE HERE

At Government request, we thus inform the public that *all* fuels and utility services, including gas, must be conserved for Victory. But we also point out that the *supply* of gas in the Pacific West is *ample;* and that only lack of men and materials prevents expansion of facilities to meet unprecedented demand.

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On such timely topics, the P.C.G.A. speaks for all member gas companies . . . in regional publications of general circulation . . . under the direction of the Cooperative Advertising Committee.

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Yes, We're Still Making Time-Tested Mono-Cast Centrifugal Pipe

Under suitable priorities, of course. Fittings also available.

NOTE: Foresighted managers are planning now to replace substitutes with Cast Iron Pipe at war's end.

American Cast Iron Pipe Company

BIRMINGHAM, ALABAMA

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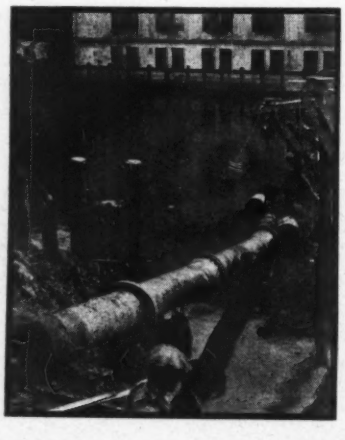


Enclosed Cooling System Solves Fume Problem at Southern California Gas Co.'s Butadiene Plant

WITH the completion of a new closed shell and tube heat exchanger system, the Southern California Gas Co.'s butadiene plant, long a subject of controversy because of tear-producing fumes cast off in its operation, is now approaching capacity production, according to Dr. George M. Hebbard of Dow Chemical Corp., who is serving the Los Angeles utility as technical advisor at the plant. The final stamp of civic approval was placed upon the plant February 17 when the Los Angeles County Smoke and Fume Commission toured the plant and found no trace of the offending fumes.

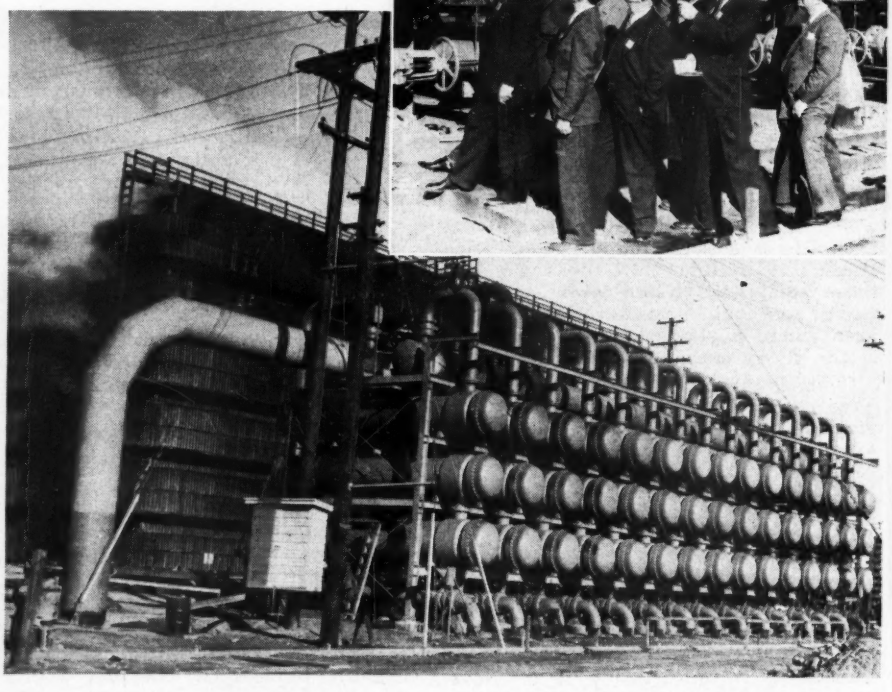
An all-important cog in the West Coast rubber program, the plant had been operating at partial capacity on an interrupted schedule due to the emission of fumes as water from the plant went over an open cooling tower (G A S, July, 1943, p. 21, and Nov., 1943, p. 29). This condition, according to Dr. Hebbard, has been entirely corrected through the expenditure by the government of more than $1,000,000 for the construction of added facilities.

A view of the new 45-unit heat exchanger system is shown in the photograph. In the inset: (left to right) C. E. Van der Oef, former mayor of Hawthorne; Earl Kudell, secretary of the Smoke Commission; Dr. Roy Newsom, chemistry department head of Whittier College; G. D. Melissarato, division engineer, Defense Plant Corp.; Prof. Howard Clapp of the mechanical engineering and machine design section of the California Institute of Technology; Wayne C. Edmister, Rubber Reserve Co., Washington, D. C.; Dr. Robert E. Vivian, dean of engineering at U. S. C.; Dr. Hebbard, Grove Lawrence, Southern California Gas Co., and Al Waxman, chairman of the Commission, editor of Eastside Journal.

Wage Increased Approved For Seattle Gas Employees

A $10 monthly wage increase for 143 employees of the Seattle Gas Co. was approved recently by the regional War Labor Board, according to an announcement made by Dr. George B. Noble, chairman of the board. The increase will go to 17 non-union and 126 union workers. The board also approved the granting of two weeks' vacation with pay after one year of service, and permitted paying of time-and-a-half wages for work on certain holidays.

AT RIGHT: Los Angeles County Smoke and Fume Commission members, government representatives, and plant officials inspect the new cooling system. BELOW: View of the 45 closed shell and tube heat exchangers.



Personnel Group Publishes Job Classification Manual

The Southern Personnel Conference group of the American Gas Association has published a manual of Gas Utilities Job Classifications, according to an announcement by Chairman C. H. Horne, Alabama Gas Co., Birmingham, Ala. Prepared by a Committee on Job Classification under the chairmanship of W. B. Collins, vice president, Peoples Water & Gas Co., Miami Beach, Fla., it represents a study of gas utility operations in the southern region of the United States.

The manual covers the functions, responsibilities, minimum training and experience required for replacements under wartime emergency conditions, and the physical requirements for 84 job classifications found in all departments of gas utilities' operations. It is for use in connection with Manning Tables, Replacement Schedules, Selective Service requirements and the like.

The books are bound and are available from the American Gas Association, 420 Lexington Avenue, New York, N. Y., at a cost of $1.00 per copy. A similar manual covering Natural Gas Distribution Job Classifications, prepared by the Southwest Personnel Conference group, is also available at the same price.

Natural Gas Gains Markedly As Wartime Fuel

According to the U. S. Bureau of Mines, marketed production of natural gas in 1942 increased 9% over that in 1941, reaching a high of over three billion Mcf. as a result of demand from wartime industries, military encampments and federal housing projects. This was more than twice the volume produced in 1917 and in 1918, first World War years. Figures for 1943 are not available, but the increase probably was over 10%.

Production in the major states increased, except for New York. Some of the reported gains are: New Mexico, 21%; Oklahoma, 15%; Louisiana, 11%; and Texas, California and Ohio, 8% each.

Exports to Canada increased 7%, and to Mexico 17% in 1942 over 1941.

The number of gas wells drilled decreased, for lack of labor and materials, from 2911 in 1941 to 2597 in 1942.

Natural Gas Output In Kansas Gains in 1943

Natural gas produced in Kansas in 1943 totaled 122,089,499 Mcf. as compared with 98,601,202 in 1942—a gain of 23,488,297,000 cu. ft. Daily average output increased from 270,140,000 cu. ft. in 1942 to 334,492,000 in 1943. Largest gain reported was that in the Hugoton field, where the increase was from 41,418,039 cu. ft. in 1942 to 63,353,908 in 1943.

Du Pont Makes Plastic From Natural Gas

Du Pont chemists have developed a new, highly versatile plastic, named polythene, which is now ready for the market in commercial quantities—provided the processor can show necessary allocations for war purposes. The new plastic is made by the polymerization of large numbers of ethylene molecules; ethylene, in turn, is derived from petroleum, natural gas, and coal.

It is expected that polythene will be useful in peacetime for the manufacture of toothpaste tubes, wire insulation, waterproof coatings, piping and adhesives. In thin sheets it is flexible but not limp and rubbery; in thicker shapes it may be classified as a rigid plastic.

Michigan Production Down

According to the report of the Michigan Conservation Department's geology division on 1943 operations, 635 tests were drilled in 1943, resulting in 233 oil wells and 47 gas wells. The wells had an initial potential of 71.55 bbl. of oil daily and 247,000,000 cu. ft. of gas. In 1942, 247 new wells had potential of 257,860 bbl. of oil; 316,541,000 cu. ft. gas.

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Canadian Well Installation Deadline Extended

N. E. Tanner, minister of lands and mines in the Alberta government, announced Feb. 10 that the date by which installation of drilling machinery and equipment must be completed on natural gas and petroleum leases issued by the province had been extended by order-in-council. (GAS, Feb., 1944, p. 53.)

The order sets the new deadline at April 1, 1945, and was passed at the request of small operators in Turner Valley field who had found they could not comply with regulations which called for completion of installations by April 1 this year. The original time had been set Sept. 21, 1942, at which time many leaseholders were in default. The new order, applying only to leases issued by the government, will affect several hundred small leaseholders.

Cooper-Bessemer Offers Compressor Calculator

A compressor calculator, designed to save critical time in computing compressor requirements or in estimating the performance of present compressor units, has been prepared by the Cooper-Bessemer Corp.

The calculator, which is made of heavy stock, is pocket size, measuring 3½ in. by 8½ in. Of slide rule design, it can be used for quickly estimating the volumetric efficiency, brake horsepower and total piston displacement of any make of compressor, although originally it was intended for use primarily with Cooper-Bessemer's well known Type G-MV engine-driven compressor units.

The device has proved so useful that it is now offered gratis to all responsible engineering and operating executives as long as the limited supply lasts. Requests should be directed to The Cooper-Bessemer Corporation, Mount Vernon, Ohio. A sheet of complete instructions will be sent with each calculator.

Amercoat Opens New Quarters

The Chicago sales office of the Amercoat Division of American Pipe & Construction Co., Los Angeles, Calif., has opened new quarters in Suite 341, McJunkin Bldg., 4554 N. Broadway, Chicago, effective Feb. 9. The move to larger quarters was announced by R. A. Glasgow, general sales manager, who will make his headquarters there. With J. W. Staples, Jr., Amercoat sales representative, he will continue to serve industrial firms in Chicago and surrounding territory. Amercoat Plastic Coatings are widely used to protect equipment, structures and surfaces from corrosion; and foods, beverages and other supplies from contamination.

Wide Program Planned by Bureau of Mines

The Bureau of Mines, according to figures shown in the budget for the fiscal year 1945 has recommended appropriations for oil and gas functions of $607,640, an increase of nearly $75,000 over the estimate for the present fiscal year.

Among the problems to be worked on under the proposed budget are increasing oil recovery, disposal of oil field wastes, corrosion of field equipment, and secondary recovery methods.

New Subsidiary and New Name for Wisconsin Rapids

In anticipation of expanded activities after the war, the name of the Wisconsin Rapids Gas Co. has been changed to the Wisconsin Rapids Gas & Electric Co. In addition, a new wholly-owned subsidiary of that company, the Wisconsin Rapids "City Gas" company has been formed to handle the strictly utility activities of the company.

New Canadian Legislation Aimed at Gas Wastage

Several conferences were held in Calgary, Alberta, in the first week of February with regard to natural gas legislation Premier E. C. Manning's government intends to introduce when the legislature is convened.

Premier Manning's original announcement, some six months ago, gave these main objectives: to eliminate gas wastage to as great a degree as possible in Turner Valley; to make it possible for all producers in the field to share prorata in the available gas market, rather than allowing Royalite Oil Co. a monopoly.

Certain aspects of the proposed legislation, as it will affect Calgary gas users, were discussed Feb. 3 at a meeting between J. J. Frawley, of the provincial attorney general's department, and a subcommittee of Calgary's special Civic Gas Rates Committee. This meeting was behind closed doors.

Earlier, Mr. Frawley, a former chairman of the Alberta Petroleum and Natural Gas Conservation Board, also held discussions with officials of Royalite, British-American Oil Co., and a number of other smaller firms.

Sunray Texas, Buys Well and Distribution Lines

The Sunray City Commission has bought from Shamrock Oil & Gas Corp. a natural gas well and distribution lines in Sunray for a price of $15,000. The town issued $16,000 in revenue bonds to pay for the system and to make some immediate improvements. Interest on $6000 of the bonds is 4%; on the remainder, 3%. The bonds mature in 10 years, but the town has the option of retiring them in five.

Production Awards

• Admiral C. C. Bloch, USN., chairman of the Navy Board for Production Awards, has announced second and third star renewals of the Army-Navy "E" production awards to the Harrison, New Jersey, and Wellsville, New York, plants of **Worthington Pump and Machinery Corp.** These two awards constitute the 12th and 13th honors accorded the men and women and management of Worthington.

• The Army-Navy "E" award for excellence in production was conferred upon the **Cochrane Corp. of Philadelphia** in ceremonies on Feb. 15. The corporation has been manufacturing power plant equipment since 1863, specializing on water conditioning equipment, filters, blow-off systems, steam specialties and flow meters.

• In a joint ceremony at Amarillo, Texas, on January 19, Rear Admiral Charles E. Rosendahl and Colonel Frederick H. Chetlain presented the Army-Navy "E" award for excellence in war production to the **Amarillo** and **Exell Helium Plants** of the **Petroleum and Natural Gas Division, Bureau of Mines, U. S. Department of the Interior.** This was the first time that the Army-Navy "E" award had been given to civilian governmental agencies.

A brief article on the history and importance of helium production appears on page 26.

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